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REVIEWS, ABSTRACTS, AND REPORTS,

IN

Medicine, Surgery, and Collateral Sciences.

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2. The Retrospect of Medicine. Edited by James Braithwaite. Simpkin, Marshall, and Co.
3. Pharmaceutical Journal.
4. The Lancet.
5. The British Medical Journal.
6. The Journal of Mental Science. London: Churchill.
7. The Glasgow Medical Journal. A. MacDougall.
8. The Medical Press and Circular.
9. Transactions of the Medical and Chirurgical Society. London: Longmans.
10. Transactions of Obstetrical Society London: Longmans.
11. The Practitioner; a Monthly Journal of Therapeutics. Macmillan and Co.
12. The Journal of Anatomy and Physiology. Macmillan.
13. Brain. London: Macmillan & Co.
14. The Bristol Medico-Chirurgical Journal.
15. The Provincial Medical Journal.
16. The British Journal of Dermatology.
17. The Asclepiad.
18. The Medical Chronicle.
19. The Birmingham Medical Review.
20. The Liverpool Medical Journal.

CANADA.

21. The Montreal Medical and Surgical Journal. Richard White. Box 386, P.O., Montreal.

AMERICA.

22. The American Journal of the Medical Sciences. Philadelphia: Henry C. Lea. London: Trübner and Co.
23. The Medical Record. New York: William Wood & Co.
24. Medical News. Philadelphia: Henry C. Lea, Son and Co.
25. The American Journal of Insanity, Utica, N. Y. State Lunatic Asylum.
26. The American Journal of Obstetrics and Diseases of Women and Children. New York: William Wood and Company. London: S. Low, Son, and Marston.
27. The New York Medical Journal. New York and London: D. Appleton & Co.
28. The Medical and Surgical Reporter. Philadelphia: N. A. Randolph, M.D., and Charles W. Dulles, M.D.
29. Journal of Cutaneous and Venereal Diseases. New York: D. Appleton & Co.

AMERICA.—*continued.*

30. The Times and Register. New York and Philadelphia.
31. Chicago Journal of Nervous and Mental Disease.
32. The St. Louis Medical and Surgical Journal. St. Louis: Frank M. Rumbold and Co.
33. Journal of the American Medical Association. Chicago, Illinois.
34. Index Medicus. George S. Davis. Detroit, Michigan.
35. The Occidental Medical Times. James H. Parkinson, Editor, Sacramento, California.
36. Pacific Medical Journal. 603 Sutter-street, San Francisco: Winslow Anderson, A.M., M.D.
37. Archives of Pediatrics. New York: Baily & Fairchild.

FRANCE.

38. Répertoire de Pharmacie, Archives de Pharmacie, et Journal de Chimie Médicale réunis. Troisième Série. Paris: M. C. Crinon.
39. Gazette Médicale de Paris. Paris: 4, Place Saint-Michel.
40. Journal de Pharmacie et de Chimie &c. Paris: Victor Masson.
41. L'Union Médicale. Paris: Bureau, Rue de la Grange-Batelière.
42. Archives Générales de Médecine. Paris: Asselin.
43. Bulletin de l'Académie de Médecine. Paris: G. Masson.
44. Revue de Thérapeutique Médico-Chirurgicale. Paris: Masson.
45. Annales Médico-Psychologiques. Par MM. Baillarger, Cerise, et Lunire. Paris: V. Masson.
46. Bulletin Général de Thérapeutique. Médicale et Chirurgicale. Par le Docteur Félix Bricheteau. Paris.
47. Répertoire de Pharmacie. Par M. Eug. Lebaigue. Paris: Rue de la Perle, 11.
48. Gazette des Hôpitaux. Paris: 4, Rue de l'Odèon.
49. Lyon Médical, Organe Officiel de la Société Impériale de Médecine. Lyon: Mégret.
50. Revue des Sciences Médicales en France et à l'étranger. Paris: G. Masson.
51. Gazette Hebdomadaire. Paris: 91, Rue de Lille.
52. Revue de Médecine et Revue de Chirurgie.

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53. Revue de Laryngologie, d'Otologie, et de Rhinologie. Paris : Octave Doin.
54. Annales des Maladies des Organes Génito-Urinaires. Paris : 22, Place St. Georges.
55. La Médecine Moderne. Paris.

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56. Bulletin de l'Académie Royale de Médecine de Belgique. Bruxelles : F. Hayez.
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GERMANY.

58. Archiv für Gynækologie. Redigirt von Credé und Spiegelberg. Berlin : August Hirschwald.
59. Centralblatt für die medicinischen Wissenschaften. Berlin : August Hirschwald.
60. Jahrbuch für Kinderheilkunde und physische Erziehung. Leipzig: B. G. Teubner.
61. Archiv für pathologische Anatomi und Physiologie, &c. Herausgegeben von R. Virchow. Berlin: G. Reimer.
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65. Zeitschrift für physiologische Chemie. Herausgegeben von F. Hoppe-Seyler. Strassburg : Karl J. Trübner.
66. Deutsche Medizinal-Zeitung. Herausgegeben von Dr. Julius Grosser. Berlin : Eugen Grosser.
67. Albrecht von Graefe's Archiv für Ophthalmologie. Göttingen : Professor Dr. Th. Leber.
68. Centralblatt für klinische Medicin, und Centralblatt für Gynäkologie. Berlin: Hirschwald.

NORWAY.

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SWEDEN.

70. Hygiea, medicinsk och farmaceutisk Månads-skrift. Stockholm: P. A. Norstedt och Söners förlag.
71. Nordiskt medicinskt Arkiv. Redigeradt af Dr. Axel Key, Prof. i Patolog. Anat. i Stockholm. Stockholm: Samson och Wallin.
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DENMARK.

73. Hospitals-Tidende. Optegnesler af praktisk Lægekunst fra Ind-og Udlandet. Kjöbenhavn : Jacob Lund. London : Asher & Co.
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ITALY.

76. Lo Sperimentale, Giornale Critico di Medicina e Chirurgia. Direttore Prof. C. C. M. Butalini. 35, Via Alfani Florence.

AUSTRALASIA.

77. The Australasian Medical Gazette. Sydney : L. Bruck.

INDIA.

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25. Bulletin of the Johns Hopkins Hospital. Vol. IV., No. 33. Baltimore. September, 1893.

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27. Ophthalmic Nursing. By Sidney Stephenson, M.B., F.R.C.S. (Edin.). London: The Scientific Press. 1894. Demy 8vo. Pp. 188.

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32. Remarks on the Varieties of Chronic Chorea. By William Osler, M.D. Reprint. 1893. Pp. 15.

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34. Tuberculous Pleurisy. By William Osler, M.D. Boston: David Clapp & Son. 1893. 8vo. Pp. 66. Reprint.

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38. A Text-book of the Diseases of the Ear. By Dr. Josef Gruber. Translated by Edward Law, M.D., C.M. Edin., and Coleman Jewell, M.B. Lond. London: H. K. Lewis. 1893. Second English Edition.

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40. Ueber die Behandlung des Lupus mit Tuberculin. Von Dr. H. Kossel, Assistent am Institut für Infectionskrankheiten. Berlin. Reprint. 1893. Pp. 14.

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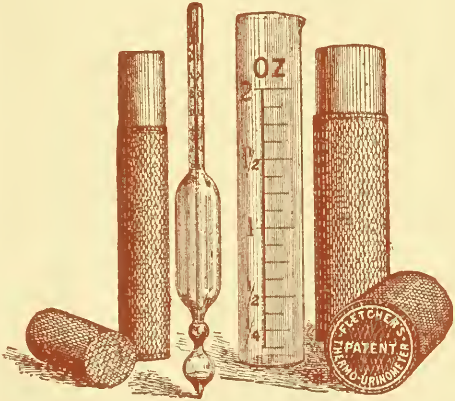

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CONTENTS.

THIRD SERIES, No. CCLXIV.—DECEMBER 1, 1893.

PART I.—ORIGINAL COMMUNICATIONS.

PART II.—REVIEWS AND BIBLIOGRAPHICAL NOTICES.

THE DUBLIN JOURNAL

OF

MEDICAL SCIENCE.

DECEMBER 1, 1893.

PART I.

ORIGINAL COMMUNICATIONS.

ART. XIV.—*Scientific Teaching in Medicine.*[a] By C. J. NIXON, M.B., LL.D. Univ. Dubl.; M.D. (Hon. Causâ) R.U.I.; Physician-in-Ordinary to the Lord Lieutenant; Professor of Medicine in the Catholic University; Senior Physician to the Mater Misericordiæ Hospital; and Member of the Senate of the Royal University.

THROUGH the kindness of my colleagues I have had the honour of filling the office of Dean of the Medical Faculty for a period of four years. This prolonged term of office is quite unprecedented in the history of this School, and I gladly avail myself of the opportunity of expressing my thanks to those with whom it has been my good fortune to be associated in the work of medical teaching. Many changes have taken place in the *personnel* of the faculty since I first became one of its members. The arm of the Destroying Angel has stricken many times, and of those who were Professors here when I was a student, but one is left to represent the old staff. The School. however, lives on, presenting, I am glad to say, the traits of vigorous youth, and attracting no small share of attention and sympathy from those who are interested in the progress of University Education.

One of the privileges of being Dean of the Faculty is that of

[a] Introductory Address delivered at opening of Session 1893-4, in the Medical School of the Catholic University, on Tuesday, October 31, 1893.

delivering an address introductory to each session, so that if I had exercised my right of addressing you, this occasion would be the fourth in succession on which I might have endeavoured to bespeak your attention. I can only say that I heartily congratulate you on having escaped three such ordeals; nor would I have ventured to inflict one upon you to-day but for the express wish of my colleagues, and for reasons which I shall mention further on.

INTRODUCTORY ADDRESSES.

I am, personally, unfavourably disposed to formal annual addresses to medical students, the custom in connection with which would, I think, be "more honoured in the breach than in the observance." Advice, to be forcible, should be leavened by example; hence, probably, it is that most of those annual homilies which are produced with so much labour are attended with but little results. Men are always glad to hear words of wisdom from those leaders in the world of thought who are either the pioneers of the world's progress, or the active agents in the carrying of reforms necessary for our intellectual and material advancement. But, in the absence of such men, the annual addresses to medical students have, more or less, ceased to be attractive, and cannot certainly be regarded as indispensable. Divinity students, and those of Law and Engineering, have not had the advantage of "The Introductory," and, so far, the loss of it does not seem to have been felt. It has come to be recognised that young men preparing for professions are entitled to that joyous sense of youthful responsibility which belongs to them as University students, and which should be fostered by example and precept, rather than crushed by dogmatism. There is some force in the injunction given to students by Lessing—"Think wrongly if you like, but think for *yourselves*." Spoon-feeding in professional knowledge, at any stage, is fit only for mental invalids; you who come to us with, I hope, healthful and vigorous minds, have within yourselves a fund of that stimulus which will help you to dispense with much formal aid—the love of Knowledge for its own sake alone.

Within the past five or six years very considerable changes have been effected in this School of a sufficiently progressive character to render an account of them a matter of public interest, and, in directing attention to them. I purpose briefly, and within a necessarily restricted compass, to discuss the position of those branches of scientific medicine which form the chief burthen of the work done here.

A SCHOOL OF MEDICINE AN OBJECT OF PUBLIC INTEREST.

I would first of all point out that it is quite an error to suppose that the progress of a school of medicine is a matter which concerns only those who are responsible for its organisation. Its progress much more closely concerns the public at large. It is here that young men are taught that which is the aim and business of their lives. They come to us young and inexperienced, impressionable for good or evil, and upon the lessons which they learn, and the habits of thought they acquire, depends the course of their future, whether that be one of usefulness to their fellow-man and honour to themselves, or one of failure and disappointment. Apart, too, from its teaching purpose, a medical school fulfils another function. It is a centre in which is collected a number of earnest and thoughtful men, each one interested in the progress of his own special department, adding to the storehouse of facts, and aiding by investigation and research the aim of medicine in relation to disease and its prevention. It is scarcely possible that the work of such men can be without influence upon their fellows, or that the community at large will not be the gainers by their labours. A school of medicine, like the University of which it forms a part, may be regarded as a fair index of the intellectual life of the nation, and no small degree of material prosperity or the reverse may be traced to its success or failure. The nature of the work done in it may, too, be regarded as a measure of what is taking place in the world at large from the fact that medicine is probably more sensitive to changes outside itself than any other branch of human knowledge. It deals not alone with physical but with psychical phenomena—with the social influences of wealth and poverty; peace and war; birth, development, and decay. Everything that affects the environment of the individual must influence the conditions of his mental and physical state, and so lead the physician into trains of inquiry, into the varying phenomena of existence, and the diseases that follow in their wake. For these reasons it is a matter of general interest to show how this school stands as a centre of medical teaching, to analyse the work it has done, estimate our gains, note our defects, and formulate, if possible, schemes for their redress.

In endeavouring to point out the present position of medicine, considered only in its scientific aspect, I need hardly say that the description attempted of the successive stages of development of each branch must be sketchy in character, and that only those developments which mark eras in progress can be noticed.

SCIENTIFIC POSITION OF MEDICINE.

It will be conceded by all that the present position of medicine as a science depends upon the progress which has been made, especially during the latter half of the present century, in those subjects upon which it rests as on a tripod—viz., anatomy, physiology, and pathology.

ANATOMY.

Of Anatomy, I need say but little. It holds, and always will hold, in medicine the position of being the keystone of the arch, the basis upon which are built all other branches of medical knowledge. Without an accurate idea of the conformation of the body, and of its integral parts, it is obvious no insight could be acquired into the functions of the various organs and tissues, and the mode of their development. From structure to function is a natural transition, hence the anatomists may claim that by their earnest, patient, and continuous efforts, they have laid the foundation for physiological research. Early in the present century the microscope was introduced as an instrument of investigation, and by its means, chiefly owing to the labours of Bowman, the study of minute anatomy or histology, especially in reference to embryology, or development, gave so great an impetus to the entire subject that it may be said to have placed it almost on a level with the exact sciences. By the aid of the microscope, Schleiden discovered the cellular structure of vegetable tissues, whilst, a little later on, Schwann demonstrated the fact that all living structures are made up of minute particles of living tissue called cells, which, subsequently, the physiologist determined to be the seat and source of all forms of vital activity. It was about the same time that Mohl gave the name of "protoplasm" to the hyaline material which forms the lining of cells in plants, a term subsequently given to the essential constituent of all living structures.

It is scarcely necessary to dwell further on the light which was shed upon the various structures of the body by the study of histology. No branch of human knowledge represents more thorough and painstaking investigation than does this one—there is none that testifies more to the wondrous power of man in unlocking the mysteries of nature. Whether we are to regard anatomy in the light which it throws upon the processes of development, or in that which it sheds upon the structure of such intricate organs as the eye, the central nervous system, the various glands, &c., it is impossible not to recognise its study as the foundation upon which the superstructure of medicine is built; and it is because the foundation has been well and carefully laid that the edifice raised upon it has such strong and goodly proportions.

PHYSIOLOGY.

Turning now our attention to physiology we find that, unlike the progress which has been made in anatomy—a progress which has been steady, and, except at the time of the introduction of the microscope into use, free from those convulsions of thought which constitute epochs or eras in the history of a science—physiology has developed not by stages but by bounds, each period of change revolutionising that which was learned or taught beforehand. In 1628 Harvey discovered the circulation of the blood, an event which led at the time to a scientific *renaissance*. Before this the crudest notions prevailed with regard to the processes of life. The idea of the circulation was that the blood swayed backwards and forwards in the veins "like the tide of Euripus between Attica and Eubœa." At this time anatomy was but in its infancy, chemistry and pathology were almost unknown, and the knowledge of zoology and botany might be said to be confined to that obtained by studying the natural history of drugs employed in the treatment of disease. Some degree of order in thought resulted from Harvey's discovery; it gave a special stimulus to the study of anatomy, and awakened an interest in the study of physiology which, under the deductive method of inquiry, led to considerable speculation regarding the origin of life and the vital functions generally. The progress made was, however, slow and unequal. Theorising took the place of observation. It was considered an evidence of high intellectualism to philosophise ;

to observe or experiment was regarded as fitted only for those of inferior mental mould.

RELATION OF PHYSICS AND CHEMISTRY TO PHYSIOLOGY.

When, however, physiology by a gradual process of transition became a science of induction, when observation and experiment were made preliminaries to induction, Helmholtz mentions some curious instances which may be cited as showing the position physiology then held, and the prejudices which it had to overcome. He, himself, was strongly urged by a colleague in the University, who interested himself in the reorganisation of the medical school, to divide the subject of physiology so as to be left free to devote himself exclusively to the intellectual part of it, whilst the experimental part could be undertaken by a colleague of inferior mental calibre, but quite good enough for that purpose. Not long before it was thought that to examine with the stethoscope was a crude method of investigation, that it lowered and debased the patient, who was after all a human being, and that a physician with a clear mental vision did not need such aid. In reference to the use of the ophthalmoscope, a celebrated surgeon gave it as his opinion that it was dangerous to allow crude light into the eye; whilst another said that it might be useful for physicians with bad eyes—his, however, were good, and he did not need to use it. These are instances which show how much the tendency of opinion at the time was aganist the use of experiment as a means of investigation of phenomena. Authority and prescription dominated procedure both in practice and in teaching. But an unseen force was steadily leading up to an inevitable change in the methods of inquiry. The study of natural philosophy had attracted the attention of the keenest intellects; the laws which had been discovered in mechanics, hydrostatics, optics, acoustics, electricity, and magnetism, began to be applied in the explanation of the processes of life, and the experimental methods employed in the physical laboratory were borrowed by the physiologist to determine the mechanics of the circulation, the laws relating to muscular and nervous responses to stimulation, the processes of absorption, and the phenomena affecting the special senses. About the same time chemistry had been making rapid strides, and great attention had been given to the study of organic bodies with the result that many, which had been regarded as the product of vital processes, were made in the laboratory. It soon came to be recognised that, for the most part, conditions which were supposed to be the result solely of vital energies, were capable of being split up into processes identical with those met with in the non-living world, so that, with some notable exceptions—especially those relating to absorption and certain nervous phenomena, and with the full admission that physiology can never become more than a mere branch of physics and chemistry—we have come to recognise that the true method of studying a vital phenomenon is to analyse it into its *measurable* physical and chemical constituents.

It is not difficult to realise the effect of the application of these sciences to the methods of physiological inquiry, and the origin and scope of modern physiology dates from their use. It dates from the time of Joannes Müller of Berlin, followed by those whose names are household words to us all—Brücke, Du Bois Raymond, Ludwig, and Claude Bernard. It is important to note that nearly all those great men were physicists as much as physiologists, and that most of the methods of investigation employed by them have been designed and in most instances made by themselves. With these notable exceptions, it may be said that to these men alone is due the scientific position held by physiology at the present day, though England can claim, through three of her sons, that she, too, has made three landmarks in its history—the circulation of the blood discovered by Harvey, the functions of the anterior and posterior roots of the spinal nerves by Sir Charles Bell, and the reflex function of the nervous system by Marshall Hall.

WHAT MEDICINE OWES TO EXPERIMENTAL PHYSIOLOGY.

In the routine practice of medicine and surgery we are apt, perhaps, to lose sight of what we owe to physiology, especially to experimental physiology. From experiments upon animals we have learned the mechanism of the sounds of the heart, the position of each sound in the cardiac cycle, and the conditions of the cardiac muscle. To these experiments we can trace most of what is known regarding the pulse; the conditions which affect its rate and tension. So, too, with the phenomena of respiration and the causation of cough. In studying the different forms of paralysis of the cranial nerves, we are utilising the researches of Reid; in observing lesions of the vaso-motor system we are dealing with phenomena which attracted the energies of men like Pourfour du Petit, Schiff, Goltz, and Gaskel; in noting disturbances affecting the brain and spinal cord we are drawing upon the information supplied to us by the experimental observations of Hitzig, Fritsh, Ferrier, Brown-Séquard, Marshall Hall, and Charles Bell. I do not in any way exaggerate when I affirm that all that is exact in medicine which refers to organic function is based upon the results obtained by painstaking and laborious experimentation. So great has been the progress made, so difficult is it to master all the facts that have been ascertained before any further development can be made, or fresh fruit garnered by those who represent continuity of work in this branch of medicine, that physiology has necessarily become specialised as a subject of teaching, and no modern school can afford to permit any teacher to deal with it without requiring that he should give to it his undivided attention.

INFLUENCE OF PHYSIOLOGY ON PATHOLOGY.

The influence which the study of physiology has exercised upon its twin sister, pathology, is easily understood. As physiology is the science of normal function, so pathology represents to us the deviation from the standard, the points of departure from health, the causes which produce such aberrations of function, and their effects upon the organs and tissues of the body. A few words will suffice to deal with the progress made by pathology during the century. Like physiology it, too, has had its periods of revolution, one of which may be regarded as probably the most pregnant of potentiality in the history of medicine—viz., the study of those minute vegetable cells known as bacteria, and their effects when engrafted on the human organism.

In 1760 Morgagni published his celebrated treatise, in which, for the first time, the attempt was made to localise disease to *particular* organs of the body, whilst a most accurate account was given of the anatomical changes produced as a result of the morbid action. There was, however, no attempt made by Morgagni to indicate with any degree of precision the ætiological factors in the production of disease. In the first decade of this century Bichat went a step further, and localised pathological changes in certain tissues of the organs of the body. Then came, late in the "fifties," the epoch-making discovery of Virchow, who published his work on cellular pathology, a work which raised pathology from being, as it then was, a repository of dry disjointed facts, disjointed in their relation to each other, to the rank of a science, a science based on ætiology, and constituting, in conjunction with therapeutics, the essential part of Modern Medicine. What a monument of work does not Virchow's life represent! How keen and penetrating has been his vision, how cogent his reasoning! Starting with an investigation of all that had been done by his predecessors, whose researches and observations he verified for himself, he carefully extended the scope of their inquiries by physiological experiment and clinical observation until he obtained that result which now constitutes the cardinal element in the explanation of all diseased processes.

Schwann and Goodsir had demonstrated the cell as the vital unit of all organised structures. Under normal physiological conditions these cells had to perform a definite function, retaining their original and characteristic forms so long as the function performed by them was normal. Virchow, by a careful study of the life-history of the cells, noted certain changes occurring in them, connected these changes with perversion of function, and working still further backward, was led to study the altered condition of growth and environment that determined both alteration of function and of structure. He thus established such a correlation between normal and pathological biology, that in many cases it was almost impossible to determine where the one becomes merged into the other; and, furthermore, he showed that the marked changes observed in the altered cells, tissues, and organs of the body were shown to be as much the result of altered environment as the cause of perverted function. The effect of Virchow's teaching was far-reaching. When it was ascertained that the bodies of animals were composed of structures similar in many respects to the analogous parts met with in man, and that the cells composing these parts were also alike as regards their structure and function, comparative pathology became an object of close study and observation, culminating in those experimental researches which have influenced to so marked a degree our knowledge of disease and its treatment.

BACTERIOLOGY.

Meanwhile, as Virchow was pursuing his researches, a branch of biology, surpassing in the interest which surrounded it, was making steady progress—viz., bacteriology, adding another to the quota which all branches of human knowledge pay to medicine. We have the authority of Bacon that, even in his day, it, above all the other professions, could claim the palm for learning. How much more can this distinction be claimed for it to-day? When Latin served the purpose of welding all Western races together, it was the language of medical literature. Medicine, alone, amongst the faculties of a University, has an unbroken tradition of over 2,000 years from the Greek; it retains even still the relics transmitted to it by the physician of Cos. I have touched on the contributions which it has exacted from the natural and experimental sciences, whilst to pathological medicine in particular every branch of biology must bring a part of its treasures—anthropology, ethnology, and comparative anatomy. Thus we can see, as has been well said, at one end, peoples, nations, and races; at the other, a tiny speck of nucleated protoplasm, which not alone appears capable of supplementing our knowledge of the larger units which constitute the organs and issues of the body, but the study of which is probably destined more than any force we know of in nature to influence the future of the human race.

Time does not permit of my dealing with the influence which bacteriology has exercised upon pathology, with which it is now indissolubly connected; or of my dwelling upon the benefits which its study has conferred in relation to commerce, or to the saving of life in animals and in man.

PASTEUR'S RESEARCHES.

The history of bacteriology, so far, may be said to be written in the life and labours of Pasteur, supplemented by the records of what has been done by Lister, Chauveau, and Koch. There is no tale of Jules Verne which is more capable of exciting the imagination than the story of Pasteur's work. Having demonstrated the dependence of fermentation of different kinds upon different living organisms, which he classified into those that live in air and those to which air is fatal—aerobic and anaerobic organisms—he formulated his method of dealing with diseases affecting vinegar and wines, and almost at a stroke abolished the maladies affecting both. He next directed his attention to the investigation of the diseases of the silkworm, at the time when the silk husbandry in France was in a state of ruin. Having discovered the minute organisms which caused the disease in the blood of the worm, he followed them through all the phases of the insect's life—through the eggs, through the worm, through the chrysalis, through the moth. As by an enchanter's wand, at Pasteur's bidding, the disease was almost eradicated. Then came his "Studies on Beer," and, subsequently, those observations and experiments upon the germ theory of disease which led him to adopt the principle of *virus attenuation* in the treatment of such diseases as fowl cholera, anthrax, quarter evil, and, finally, hydrophobia. Meanwhile, the clear mind of Lister was seizing upon the germ theory of fermentation and putrefaction. The organisms which produced both were in the atmosphere. If they came in contact with an open wound, pus-formation was the result. A further fact was established by Lemaire in an adverse criticism of Pasteur's views—viz., that the presence of carbolic acid was inimical to the life of the higher animals and plants, and also to the lower organisms; the addition of a small quantity of carbolic acid to fluids in which fermentation and putrefaction ordinarily take place preventing the incidence of these processes. From these two data Lister built, step by step, the theory and practice of antiseptic surgery—a theory and practice which have saved thousands of lives and revolutionised the treatment of wounds and the routine of surgical practice. Surely the advent of the science of bacteriology may claim to be a second scientific *renaissance.*

ACTION OF BACTERIA IN DISEASE.

Before leaving the subject I may be permitted to mention an instance suggestive of the *rôle* played by bacteria in disease. We know that in the process of fermentation yeast grows and multiplies with extraordinary activity, splitting up the sugar into CO_2 and alcohol, till its further progress is arrested by the alcohol which is a product of its own activity. It is precisely similar with bacteria, when taken into the body as in any infectious fever. The organisms multiply at the expense of the fluids of the body, form ptomaïns which, like the formation of alcohol in fermentation, bring the action of the microbes to an end. It is to the presence of these ptomaïns in the blood that we may attribute the feverish disturbance that is set up—a disturbance unfortunately that is often fatal to the host as well as to the invader. An interesting experiment serves to show how the cells of the body resist the invasion of bacteria. A small quantity of a culture of known virulence was injected into a rabbit, a local inflammation followed, terminating in the formation of a small localised abscess, but no other bad effects followed. In another rabbit a similar injection was given, but, at the same time, a quantity of chloral was injected sufficient to paralyse the leucocytes, general infection rapidly followed, and the animal very soon died. In this instance it was found that the leucocytes examined on the warm stage showed no change of shape, and were perfectly sluggish in their movements. They took no notice of the bacteria when introduced into the subcutaneous tissues, and these then passing into the lymphatic spaces, ultimately reached the circulation, and so led to their widespread diffusion through the different organs with an attendant fatal result. This experiment may be taken as suggestive of the way in which the effects of alcohol taken to excess, or a poisonous influence of a like kind, may lead to an attack of fever, erysipelas, or some septic disease.

BACTERIA IN RELATION TO ANIMAL PLAGUES.

Two instances may be mentioned to show how the progress made by bacteriology has been utilised in the removal of animal plagues. Some eighteen months ago a plague of field-mice in Thessaly and its neighbourhood had assumed such proportions that an entire field of corn was destroyed in a night. Lœffler, who has made such important researches in connection with the organisms of diphtheria, discovered bacteria, the *Bacillus typhi murium*, which are pathogenic for mice of the species *Arvicola arvalis;* the field-mice in Thessaly belonged to an allied species. Preliminary investigations showed that the bacillus was fatal to these also. A culture fluid was carefully prepared, and to this was added pure cultures of the bacillus. It was first shown that the bacillus was harmless to all domestic animals and to man. Peasants came from different districts, each bringing with him a basket of broken bread, which was steeped in the inoculated fluid, and the peasants were dismissed with instructions to put into each mouse-hole a portion of bread. The mice eat freely of the impregnated bread, with the result that, after some days, dead and dying mice were found scattered through the field. In less than four weeks the plague had disappeared, and the harvest was saved. Professor Bilgard, Director of the Research Station in San Francisco, records a similar procedure, which rescued the country from a destructive "field-bug" of a species akin to the Colorado beetle.

THE FUTURE OF MEDICINE DEPENDENT ON PATHOLOGY AND BACTERIOLOGY.

Of the field that is opened up in connection with Preventive Medicine, and in the treatment of such diseases as cholera, tuberculosis, tetanus, diphtheria, typhoid fever, and infectious diseases generally by the study of bacteriology, it would be at present rash to speak. Much has been done, great advances have been made, and great principles established. It may not be many decades distant when some startling results will be attained. To my mind, it is to bacteriology and pathology generally that we must look for the future of Medicine. Fortunately the methods of inquiry employed, those necessary for the progress, nay, for the existence of the human race, have stood well the strain fomented by misguided and ignorant faddists, but the issues at stake are too vital to be imperilled by what Sir William Gull described as the greatest cruelty in the whole world—the cruelty of ignorance. Experimental physiology and pathology have simply shared the fate which attended great discoveries in science, arts, and medicine. In the last we have had the spectacle of Vesalius, the great reformer of anatomy, being formally cited before the Theological Faculty of Salamanca, and Servetus being burned at Geneva with his book in which he described the circulation through the lungs. For a considerable time after the discovery of the circulation by Harvey, the treating of his doctrine was proscribed by the University of Paris, and to believe in it, led to expulsion from the University and forfeiture of degree. Nor can it be said that the errors taught have been confined to the ignorant. Kant was so blinded by prejudice as to denounce vaccination "as the inoculation of bestiality." History is always repeating itself, and so the men of progress in medicine have had to take their share of contumely and bear more than their share of malice and misrepresentation from the anti-vivisectionists. They have stood their punishment, for the most part, with the stoicism of the ancient martyr. Yet the provocation to retaliate has been great. Scarcely any great advance in the doctrine of immunity has been made without the individual workers undertaking the risk of watching in their own persons the effects of inoculation of attenuations of the most deadly poisons.

Quite recently Haffkine, in order to test the value of protective inoculation against cholera, inoculated himself with an attenuated virus of the disease. Very considerable constitutional disturbance, lasting for six days and attended with a rise of temperature, resulted. Hankin, and some eight others, also submitted themselves to the inoculation experiments, and with like results.

ANTI-VIVISECTIONISTS.

These are types of men to whom Canon Wilberforce applies the epithet "inhuman devils." It is, at all events, a relief to learn that there are some devils humane in their instincts. It may be that the Canon is impressed with the responsibility of having to bear a great name—*Stat Magni Nominis Umbra*—or that he believes he has received a double dose of humanity, but it would be well if he were to bear in mind a very old and suggestive proverb:—"If the blind lead the blind, both will fall into the ditch." It is not likely that Canon Wilberforce or the other champions of the anti-vivisection crusade will be able to impede the progress of what is essential to the preservation of man by their fitful spurts of noisy declamation. Many years ago an enlightened Chinese Emperor, Chi Hwangti by name, came to recognise that his country was kept back by its exclusive devotion to the classics of Confucius and Mucius. He accordingly invited five hundred Professors of these subjects to Pekin, requesting them at the same time to bring with them the copies of the works of these authors. Having first entertained the Professors at a banquet, he immediately afterwards buried them alive with their manuscripts. I am far from suggesting that opponents of reform and progress should be dealt with in any such summary fashion; I merely mention the incident as conveying an object lesson. It shows how tolerant we are in the nineteenth century with those who prefer the safety of animals to the extinction of their own race.

REPORT OF THE ROYAL COMMISSION IN REFERENCE TO EXPERIMENTS ON ANIMALS.

In 1876, a Royal Commission, composed of such men as Lord Cardwell, Mr. W. E. Forster, Sir John Karslake, and Mr. Hutton, after receiving evidence of a detailed and elaborate character from, amongst others, Paget, Acland, Lister, Professor M'Kendrick, Turner, and Robert M'Donnell, reported in reference to the discoveries that had been made by experiments on animals, as follows:—"It would require a voluminous treatise to exhibit in a consecutive statement the benefits that medicine and surgery have derived from these discoveries." If this was true in 1876, how much more so is it to-day? How great has been the progress since then! How much is to be hoped for in the future! Those who have spent some time in Brussels can scarcely have failed to visit the Wiertz Museum. Amongst the paintings of this eccentric genius is the remarkable one of the man of the future regarding the things of the past. The principal figure depicts a man of giant form with a gigantic head, for it is intended to represent the men of the future as giants in civilisation as compared with the people of our day. He holds in his colossal palm some curious toys of the present day, which he regards with an expression suggestive of curiosity, amusement, and contempt. To me, gentlemen, that man of the future represents the medicine of the future. The toys are some of our present methods of inquiry, the devices of present-day physicians in endeavouring to satisfy the demands of an over-credulous public, but, probably, the smallest toy, a speck of merely bacterial proportions, which meets the gaze and excites the mirth of the giant, is the Salvation Army of anti-vivisectionists.

THE HISTORY OF THE SCHOOL OF MEDICINE.

It is now time to ask what position the School holds to enable it to cope with the modern requirements of medical teaching, and the advances that have been made in scientific medicine? What has it done to keep the standard of education up to the level of the present day progress? It is not difficult to answer these questions, and both should be dealt with in the strictest truth. Just forty years ago, under the Rectorship of the illustrious Newman, this School passed from the Apothecaries' Hall Company into the hands of the Episcopal Board of the Catholic

University. It commenced its mission under, in some respects, favourable circumstances. Its various chairs were moderately endowed, and it attracted to its halls such men as William K. Sullivan, Lyons, and Hayden. Representing the professional School of the Catholic University, it was, moreover, to be regarded as a protest against the spirit of intolerance and ascendency which prevailed; its establishment was intended not alone as a place where students would be taught the various subjects of the medical curriculum, but also to form a nidus or home where ardent workers, who had attained distinction, or who have given evidence of future promise, might have an opportunity, debarred to them elsewhere, of devoting themselves to the work of teaching and research.

But, on the other hand, many circumstances, unfavourable in their nature, prevented the mission undertaken by the School being as fruitful as it might otherwise have been. An old building was acquired, stunted in proportions, unattractive in appearance, structurally defective and unfitted, even at the time it passed into the hands of the Episcopal Board, for the purposes of medical teaching. It was, however, the best that could be obtained at the time, and, as it had been a medical school, it was assumed that it was quite suitable for the purpose for which it was designed. In the appointments to the various chairs, men were selected to fill those of anatomy and physiology who were practising physicians, holding at the same time the posts of physicians to hospitals, and the two subjects were joined together in the one chair. It is not necessary to dwell on the anomalous arrangement which permitted anatomy and physiology to be treated as one subject, and to be dealt with by practising physicians.

Furthermore, the School was an University School only in name. It had none of the ordinary privileges or advantages of such a School. Its students, like those of a proprietary school, could obtain only the licenses of the Colleges of Physicians and Surgeons. They were completely debarred from the advantage of getting any university medical qualification unless they passed a term in one of the Queen's Colleges, or entered the profession through the portals of the London University. To these disadvantages might be added a sentimental one. The Catholic University School of Medicine, in the early part of its existence, was not fashionable. It was new; its students were for the most part poor, their blood, perhaps, was not sufficiently blue, and many of those who, had they been mindful of past and present history, should have stretched out a hand to aid a new and struggling institution, regarded it, to say the least, with cold indifference

We have happily lived down this foolish prejudice, and I am fully justified in saying that the School now rests entirely on its merits, and that the support given to it is given warmly and ungrudgingly.

The School pursued what may be termed an uneventful career up to the time when the Royal University was established. It had trained a large number of students who, having obtained licenses in medicine and surgery, filled positions in the various branches of the civil and military services, whilst many attained success as practitioners in medicine and surgery at home or in the colonies of the Empire.

But the necessity for preparing students for examinations of a high standard led to a reorganisation of those chairs in the School which dealt specially with scientific teaching.

In the first place, anatomy was divorced completely from physiology and the subject departmentalised. It was given in charge to a professor who is obliged to devote himself exclusively to his special subject, and is responsible for all matters which relate to his chair.

In physiology the professor, Mr. Coppinger, the distinguished surgeon to the Mater Misericordiæ Hospital, has as his colleague a lecturer who devotes himself exclusively to the work of the chair, which is arranged so as to secure the delivery of courses of lectures suitable for advanced students as well as for those commencing their studies. Histology is made the subject of an elaborate and carefully-organised course, in which students are provided with microtomes and all reagents necessary for an examination of the minute tissues of the body.

The regulations of the Royal University require students to attend a three months' course of lectures on pathology before presenting themselves for the degrees examination. It was the first university in Great Britain to make this requirement, and to institute a special examination in this subject; and I believe this School was the first in Great Britain to appoint a professor of pathology with the obligation that, like his colleagues in the chairs of anatomy and physiology, he should confine himself exclusively to his special subject, which includes also the teaching of bacteriology.

We have not been unmindful of the requirements of Hygiene or Preventive Medicine as a branch of medical education. A public health laboratory, the first of its kind in Ireland, has also been provided, where those preparing for the examination in sanitary science will find all the necessary facilities for pursuing their studies under the charge of Professor Roche.

Not long since, upon the occasion of one of the visits of His Grace the Chancellor of the University to this School, our Rector, in eloquent and forcible language, pointed to the disabilities under which we laboured as regards our building, and the means at our disposal for teaching. Permit me to quote his words:—"But there is an eloquence, too, that pleads for us in the poverty and squalor with which the teaching of a noble profession is here surrounded. If a visitor were here to-day from any part of the Continent of Europe, from any of those centres which once were illuminated by the teaching of Irish scholars—of Columbanus, of Virgilius, of Kilian, of Gale, of Scotus—he would ask, with some degree of wonder, 'Is this the home of science which Ireland has provided for the education of her sons?'" Well, since these words were spoken within the past few years—something has been done to diminish to some extent this reproach. A sum of over £4,000 has been spent upon school buildings, and for this sum we are indebted to His Grace the Archbishop, and their Lordships the members of the Episcopal Board. They have, out of slender resources, taken the part of the State in providing us with some of the facilities that were absolutely necessary for teaching purposes. With the sum mentioned, a new anatomical department has been provided and furnished with all the modern accessories appertaining to anatomical work. New chemical, histological, physiological, and public laboratories have been constructed, and fitted with the apparatus suitable for each. The Archbishop, out of his private funds, has generously provided the School with a bacteriological laboratory, so that his name will be handed down in the annals of Irish medicine as having been the founder of the first laboratory for the teaching of bacteriology in Ireland. Several valuable prizes have been established, which have led to a healthy and vigorous competition amongst our students.

APPOINTMENTS TO SCIENTIFIC CHAIRS.

The question of the appointments to the various scientific chairs was one, I need hardly say, of serious, nay vital importance, and I am bound to add that, in this matter, the governing body of the School have exercised a wise and careful discrimination. Gentlemen, I am glad to tell you that we have grown our professors on our own soil. They are our choicest flowers, and, notwithstanding their presence here to-day, I must put them on exhibition with the usual note appended—"Catholic University School of Medicine, Gardener." I do so for three reasons—firstly, from a legitimate desire to claim some credit for this School of Medicine; secondly, to show you the stamina of the men who are your teachers; and thirdly—my old association with this place will prevent what I say being taken as intrusive—to point out how much these professors have to do in the future to fulfil the promise of their youth, and how much depends upon them in helping to rekindle the fire of enthusiasm in scientific medicine which, unhappily, in Ireland has been smouldering in obscurity. There is surely no fairer test of attainments and ability than that afforded by an university examination, in which students from every quarter compete in a common arena for degrees, honours, and other distinctions. Granting this, it is interesting to note the distinctions obtained by those to whom is entrusted the teaching of anatomy, physiology, and pathology in the school.

The professor of anatomy, Dr. Birmingham, obtained 1st of First Honours and 1st Exhibition in the 2nd Medical Examination, and 1st of First Honours and 1st Exhibition in the Primary Degrees Examination.

The professor of pathology, Dr. M'Weeney, obtained an Exhibition and Honours at Matriculation Examination; a Scholarship of £150 in the year following; First of 1st Honours and Exhibition of £50 at the B. A. Examination; Studentship in Modern Literature, value £500; First place and 1st Honours at First Medical Examination, with £30 Exhibition; and 2nd Honours and Exhibition of £25 at Primary Degrees Examination.

The lecturer on physiology, Dr. Coffey, obtained in First Medical Examination First Honours and Exhibition, value £30; in Second Arts, First Honours in Chemistry and Biology; in Second Medical Examination, First Honours and Exhibition, value £40; at B.A. Examination, First Honours and Exhibition, value £50; at Primary Degrees Examination, Second Honours and Second Exhibition, value £25; and at M.A. Examination, First Honours and Studentship, value £300.

With such records it must, I think, be freely conceded that the right men have been selected for the positions which they now fill.

NECESSITY FOR ENDOWMENT OF CHAIRS.

But an important practical question now arises, and one for which I hope a solution will soon be found. If the services of efficient teachers, especially in the scientific departments of medicine, be secured, and if an obligation be imposed upon those teachers not to engage in practice but to devote themselves exclusively to the work of the various chairs, it is but reasonable that they should be assured of such an income as would prevent the *res angusta domi* paralysing instead of quickening energy and enthusiasm. And without energy and enthusiasm no good work can ever be accomplished.

Not many realise to the fullest extent the obligations and responsibilities of a teacher who deals with subjects that may be said to be daily progressive. He must not be a mere parrot for the repetition of what anyone may find for himself in books. If a lecturer is to command respect and fulfil, in the highest sense, his function, he must be himself an earnest and original thinker, and his teaching must be more suggestive than didactic. In working at the confines of human knowledge, in his own special department, he cannot fail to have started in his own mind fresh trails of inquiry, raised doubts in order to solve them, studied obscurities until they have become clear. It is in this way that energy generates enthusiasm. Surely one can plead that men of such a type should receive an adequate remuneration. It is true that some of the best work that has ever been done in literature or science has been accomplished under conditions almost appalling in their wretchedness. A poem of Juvenal describes the misery and degradation of a needy man of letters, lodged amongst the pigeons' nests in the tottering garrets which overhung the streets of Rome, and no one has typified this condition of misery to a fuller degree than did the author of our standard dictionary. Carlisle tells us that Heyne, the son of a poor weaver, whilst editing his Tibullus, slept in a garret, with the floor for his bed and two folios for pillow, and who often had to live on peascods which he had gathered in the streets. Yet this man created a revolution in classical scholarship. Claude Bernard made most of his celebrated researches in a poor cellar. Some of Koch's best work was that accomplished when holding a lowly position in an obscure town in Germany. But however great may be the incentive to anyone to undertake scientific work in the light of research, dominated by the passionate desire to benefit his fellow man, or gain a step or two towards the goal of human perfection, no one in the present age would expect, with any sense of justice, a teacher to devote his energies to teaching in an university, or in the professional school of an university, unless, in the first place, he is provided with the facilities for teaching, and, secondly, he is secured an adequate reward for his labours. Unfortunately in both respects we are in defect. Just at the time the Royal University was established the capital fund of the Catholic University had become exhausted, and an important source of help at a critical time ceased to be available.

THE SCHOOL A CHARTERED INSTITUTION.

The School soon after this changed its form of management. It passed from the hands of the Episcopal Board and became a chartered institution under the wing of the Endowments Commission. By the charter of incorporation a most perfect machinery has been devised for a wise expenditure of funds; but there are no funds to distribute, and, so far, we may sing with the Latin poet—

"Cantabit vacuus coram latrone viator."

We have exchanged a state of disendowment for a chartered one of non-endowment. But wise and far-seeing minds see in the change a prospect of bringing through it material aid to the resources of the School. I hope that aid will not be long withheld, and that some steps may be taken to help us in our work.

"If it were done when 'tis done, then 'twere well
It was done quickly:"

is a good and wise saw; may it soon be acted upon.

NECESSITY FOR FURTHER EXPENDITURE.

Putting aside the question of endowment, the sum which has recently been so generously bestowed upon the School does not represent more than a tithe of what is actually required. The public generally are not aware of the very considerable outlay which the maintenance of a modern school of medicine involves. Let me mention some facts which illustrate this point. Within the past ten or fifteen years an unusual degree of activity has been displayed in the English schools of medicine, especially in those of London. In that space of time over £150,000 has been spent in school buildings alone—St. Bartholomew's has spent £52,000; Charing Cross, £20,000; Guy's, £16,000; the London Hospital, £25,000; Middlesex, £8,000; St. George's, £10,000; Westminster, £14,500; and the London School of Medicine for Women, £8,000. In addition to these sums, Guy's Hospital School has spent £21,000 for a residential college, and an additional sum of £6,000 to provide a cricket ground for its students; whilst Middlesex School has spent £10,000 on its residential college; so that the total sum expended within the past ten or fifteen years in London, to promote the interests of medical teaching, exceeds £250,000.

Take another instance of an effort made to develop educational progress. The regulations of the London University require practical instruction in physics, and impose a practical examination in that subject. The University College in Liverpool having had no provision for the teaching of this subject in the School of Medicine, and being unwilling to relinquish the teaching of University students, was driven to take steps for the purpose of extending its teaching of science. The Council of the College put its views as to the necessity of making provision for the cultivation and teaching of the higher branches of scientific knowledge before the public. A meeting was called by the Mayor to consider the project, with the result that at present in Liverpool there is an University College which may be regarded as a monument of the enterprise and generosity of the citizens of that town. In December of last year the new Victoria Building, an extension of the College, was formally opened. The total expenditure so far has exceeded £53,000, of which £44,000 has been already subscribed, Mr. Tate, of Liverpool, giving, for the erection of a Library block, £20,000. The necessary capital for the endowment of a professional chair was fixed at £10,000. Very soon over £30,000 were subscribed for this purpose, and, subsequently, a further sum of £9,000 was obtained to endow a chair of botany. An engineering laboratory was presented to the College by a generous donor in honour of the Queen's Jubilee. Later on a chair of economic science was endowed by Mr. Brunner, and lastly, the professorship of physiology was founded and endowed by a Liverpool merchant—a chair which, in the words of the writer from whom I take the history of the school, "has given fresh impetus to the scientific work of the medical faculty, and has shed lustre on the school by bringing into association with it the well-known name of Professor Gotch, the first occupant of the chair."

THE RELATION OF THE STATE TO SCIENCE.

What a contrast to the encouragement given to scientific teaching with us here! Perhaps it is to the great wealth of England, and the generosity of her leading merchants and others, that the apathy of the State in the matter of scientific endowment may be due. The economic law, that what can be done by private enterprise should not be interfered with, or, perhaps, hampered by State interference, has been the guiding principle on which the Government has taken its position in reference to science. Science, to accept a popular idea of it, is only of value when it can be turned into money; hence the name which England has acquired, perhaps with some degree of justice, that it is a nation of shopkeepers. It may be said to stand alone amongst European States in the apathy which it has shown in the matter of higher education. With the richest capital in the world, the pivot of the world's commercial prosperity, the home of over 5,000,000 souls, it has no teaching University. "The wealthiest country in the world," said the distinguished President of the British Association in his recent address, "which has profited more—vastly more—by science than any other, England stands alone in the discredit of refusing the necessary expenditure for its development, and cares not that other nations should reap the harvest for which her own sons have laboured."

HIGHER EDUCATION IN FRANCE AND GERMANY.

How different has been the policy pursued by other Governments, and how great has been the resulting progress. Take, for example, the condition of higher education in France and Germany, and note the strides it has made in both countries during the present century. Amidst the throes of the reign of terror, in 1794, a petition was presented to the Committee of Public Safety by Lavoisier, asking that his life should be spared until he had completed some important experiments. The answer to the petition was:—The Republic had no need of savants. What has taken place since? France had at the time the Revolution broke out twenty-three autonomous university colleges in the provinces. Napoleon, with a view of centralisation, crushed them out in order to promote the interests of one great university at Paris. But so low had this university sunk in public estimation, that in 1868 a sum of £8,000 was all that was spent on it for academic purposes. It did not, however, take long for France to shake off her intellectual lethargy. Startled by her position of intellectual barrenness, she set to work to put her educational house in order. She has now rebuilt her provincial colleges at a cost of £3,280,000, and for their maintenance she provides annually £500,000. A century has passed since she declared that the State had no need of savants. Yet, after the late disastrous war, the Institute of France discussed this important question:—"Pourquoi la France n'a pas trouvé d'hommes supérieurs au moment du péril?"—and to this question came the formal reply:—"Because France had allowed its university system to sink to the lowest ebb."

Let us for a moment turn our eyes to Germany. Scarcely a century and a half ago Frederick William, of Prussia, when attending a graduation ceremony in the University of Frankfort, exclaimed in his characteristic bluff fashion, "An ounce of mother wit is worth a ton of university wisdom." Since then what have the universities done for Germany? No country in the world has so fully recognised the necessity of promoting science as one of the most important duties of statecraft. Recognising their inferiority in their university system as contrasted with that of their neighbours, Paris, Bologna, Padua, and Pavia, they did not hesitate to attract teachers from Italy and other centres of intellectual culture, nor did they stint their supplies when re-organising and perfecting their various institutions. A single university like that of Leipzig receives over £40,000 annually—£10,000 more than that given to the three Queen's Colleges in Ireland. Strassburg has had, within a comparatively recent period, her university and library rebuilt at a cost of £711,000, whilst the annual grant to the university exceeds £43,000. There is no country in the world more economical in her expenditure or more careful in securing a return proportionate to capital laid out; yet Germany spends nearly £400,000 a year out of her taxes on university education. According to Helmholtz, 72 per cent. of the cost of universities is paid by the State, the students paying in the matter of fees a little over 9 per cent. And how glorious for the Fatherland has been the result! It has been the fashion to sneer at the higher educational system in Germany. It is said, "All wisdom in Germany is professional wisdom." But a fair test of the efficiency of the working of any particular system is to be found in the estimate of the results obtained from it; and surely, according to this standard, looking at the material prosperity of the country, her *facile princeps* position in the world of science, her progress in technical knowledge, and, above all, her pre-eminence in all those branches of knowledge which concern medicine, one must concede to Germany the palm amongst nations of having, to her own great advantage, made the most that could be made of the intellectual material at her disposal. Time does not permit me to dwell upon what has been done in Austria, Belgium, and other European countries, in the matter of education under the fostering care of the State.

THE STATE AND EDUCATION IN SWITZERLAND.

Perhaps I might give one instance of the material prosperity of a country being brought about by its influence. It was specially dwelt upon by Lord Playfair in an address delivered some years ago to the British Association. Switzerland is a country destitute of coal and the ordinary raw materials of industry. It is separated from the countries which supply it with these articles by high mountain ranges. Yet by a carefully regulated scientific code of instruction, by means of a system of graded schools, and, above all, by its great technical college at Zurich, Switzerland has become a prosperous manufacturing country.

HIGHER EDUCATION AT HOME.

How dispiriting has been the course pursued by the State at home! How crushing has been the effect of its apathy upon this poor country! How cruelly unjust has been its policy to three-fourths of our population! To what extent the present state of turmoil and discontent, the want of progress, the fierce racial and religious antagonism, may be traced to the steady and consistent policy of injustice towards Ireland in the matter of education by our Government, I leave to the decision of the impartial student of history. Ever since 1845, when the Queen's Colleges were established, a steady and persistent demand has been made to both Liberal and Conservative Governments to settle this great and vital question, but without avail. It would be a waste of time to go over the well-beaten track of barren promises and crushed hopes. Let me merely enumerate the headings of some of the chapters. The offer of a charter of incorporation for the Catholic University by Sir George Grey in 1866; the supplemental charter fiasco of the same year; the coquetting of Lord Mayo with the bishops in 1867; Mr. Gladstone's great effort in 1873; the establishment of the Royal University in 1879; Mr. Balfour's remarkable statement in Parliament, and his subsequent famous speech at Partick in December, 1889; and, though last not least, the recent debate in Parliament, in which the junior member for Dublin University declares, apparently authoritatively, his willingness to support the establishment and endowment of a Catholic University, followed by the impressive and suggestive words of Mr. Morley, who always means what he says, "I am rejoiced to hear that statement." I quote the words from a report of the Parliamentary debate which took place on the University Clauses of the Home Rule Bill, and which appeared in one of our daily papers of the 19th of August.

How many more chapters will have to be written before the end is reached? We cannot, however, but regard the present time as one, perhaps, more favourable for a settlement than any other period in the history of the demand. The Tory party is not likely to act in opposition to their leaders; the Irish party is pledged to demand and secure a settlement of the question; and the Trinity College party is, too, anxious that an university should be established and endowed to meet the requirements of the Catholics of Ireland.

THE UNIVERSITY OF DUBLIN; ITS ATTITUDE.

It is remarkable how keen is the instinct of self-preservation amongst those who are responsible for the *bien-être* of the University of Dublin. Proud, as all Irishmen must be, of her prestige, of the illustrious men, our brothers, whom she has trained, we cannot but lament the narrow-minded policy which led her to shut out from her halls the Catholic youth of Ireland because it was Catholic. We cannot forget that it took nearly three centuries before the University of Dublin realised the necessity of throwing open her great prizes, scholarships, fellowships, &c., to others than those belonging to the Established Church in Ireland, and even at this late hour of the day it is a matter of debate as to whether the step was taken as an act of liberality and fair play, or as one of expediency. But a few years before, a remarkable proposal emanated from the pen of Dr. Lloyd, the Provost of Trinity College,—namely, that denominational colleges, including a Catholic University College, should be established in Dublin, entrusted with the moral and disciplinary care of university students of the various denominations, while Trinity College should continue to discharge the same duty towards Protestants, but that the teaching, as well as examination, should be common to all, and should be conducted by the University, of which the present University of Dublin should be the nucleus.

Many will think that this proposal, just and broad-minded, evincing a desire to regard the youth of Ireland as a whole, not as consisting of several distinct species, one of which was specially to be looked on as alien and inferior, would have settled this burning question to the advantage, not alone of the intellectual life, but also of the material prosperity of the country. But, as if Provost Lloyd had calculated without his host, the proposal was never seriously pressed, and Mr. Fawcett's motion to throw open Trinity College to persons of all religious denominations was carried with the acquiescence of the university authorities. Just now a great political change is in the air, and again University Education attracts the attention of Trinity College. This time the question is formally brought forward in an able and temperate address read before the College Historical Society, the burden of which was to give to the Roman Catholics an university for themselves. Of course, so striking a pronouncement could scarcely be regarded as otherwise than authoritative, but if there were any doubts as to this, the discussion which followed the reading of the address completely dispels it. It is not likely that Judge Webb (until lately the distinguished public orator of the university), Professor Mahaffy, and Lord Justice FitzGibbon, would give expression to any views upon university reform without the knowledge and approbation of the Governing Body of their *Alma Mater*. There is, indeed, a consensus of opinion amongst the different speakers at once remarkable and suggestive. Judge Webb made, as he always does, an able and eloquent speech. It was marred, perhaps, by some traces of inconsistency. He claimed for the university that it was in no sense a sectarian or exclusive institution, but he proceeded to demonstrate its liberality and non-sectarianism in the following words:—"The university was founded by Protestants for Protestants, and in the Protestant interest. A Protestant spirit had from the first animated every member of its body corporate. At the present moment . . . the *genius loci*, the guardian spirit of the place, was Protestant, and, as a Protestant, he said, and he said it boldly, Protestant ought it evermore remain." What strange evidence of the non-sectarian character of the university! Lord Justice FitzGibbon was, as he always is, just to others. He, too, agreed in the auditor's views as to the wisdom of establishing a Catholic university, but in one short sentence he may be said to have struck the key-note of the position always maintained by Trinity College. "He," said Lord Justice FitzGibbon, " claimed that the first principle to be insisted upon in any attempt to solve the problem of university education in Ireland, was to boldly proclaim that there shall be hands off as far as the university was concerned."

This declaration is, at all events, a courageous avowal of the policy of the University. Parliament may disestablish a State Church, it may revolutionise conditions of land tenure, it may enact any law it chooses affecting the relations of labour and capital, but the one institution that is to be held sacred from all disturbing influences, so as to be allowed to enjoy its serene and peaceful career of academic repose, is the University of Dublin. Any opinion which I venture to express upon this burning question of University education, I need scarcely say, is a purely irresponsible one. It represents only my own individual view, and cannot, therefore, be taken with the weight of authority attached to it. If at any future time the question of University education comes to be dealt with by the country which is specially concerned in it, and if any attempt be made to consolidate our university system, I cannot see how any institution can be maintained which does not minister to the educational wants of the community at large, not merely to those of a class.

The idea which is so carefully disseminated, that popularising an institution is synonymous with its destruction, is one of those popular fictions which from endless reiteration comes to be accepted almost without question, even by those who see the necessity for reform. For my part, I have a sufficient confidence in the judgment and wisdom of my countrymen to believe that in effecting any great or radical changes in our educational system, such changes will be made as will be favourable for the development of our intellectual and material resources.

THE OBLIGATIONS OF THE SCHOOL OF MEDICINE.

But, whether the settlement of the University question be within measurable distance, or, comet-like, is about to enter on its stage of periodical disappearance, our mission is a clear and definite one. It should not be merely limited to preparing students for the various medical examinations, it should be educational in respect of its teachers, it should represent the advances which are made in scientific medicine, it should itself take no slight part in the work of research and patient investigation. There are elements here in this city which should foster the growth of a vigorous and flourishing medical school; there is the healthy stimulus of rivalry, sufficient to quicken our energies without being likely to be in any way destructive; there is too, and I am glad to publicly acknowledge it, a friendly spirit shown by the scientific and other teachers of the University School of Medicine towards this school, a readiness to aid where aid is required, and a generous appreciation of work done, given with that ungrudging spirit which is the characteristic of earnest and thoughtful workers. Men like the Professors of Anatomy, Physiology, and Chemistry in the School of Physic, exercise a healthful influence over the teachers in other schools, and I sincerely hope we shall never be without a healthful measure of fair and vigorous rivalry, such as at present exists.

REFORMS NECESSARY FOR THE PROGRESS OF THE DUBLIN SCHOOL.

But if we are to hold our own with neighbouring and Continental schools we must make some combined effort—an effort made without distinction of creed or of political thought—to bring the Irish school of medicine up to the level of those of our neighbours and within measurable distance of the great Continental schools. Let us not live in a fool's paradise ? We can, perhaps, claim that we have maintained the standard of clinical teaching fully up to that attained in the time of Corrigan, Graves, Stokes, and Smith; but, in all truth, must we not admit that the scientific work done at home is not either in quantity or quality worthy of the best traditions of the Irish school? We cannot afford to overlook the fact that, owing to various causes, the number of students which appears in the "Irish Medical Register" has steadily and progressively diminished within the past ten years. In 1880 there were 536 students registered in Ireland, representing under the four years' curriculum over 2,100; in 1890 the number of registered students was 229, representing a class considerably under 1,000, thus showing in the decade a falling off of more than one half.

Has the delay in carrying out measures of reform in regard to teaching some connection with this startling decline? In 1883 an attempt was made to reform our Dublin hospitals so as to make them more suitable than they are at present for the purposes of teaching as well as to secure an equitable distribution of the grant given by Parliament for the maintenance of these institutions. A Commission of Inquiry was appointed, important evidence was collected, and a report of great value, eminently fair and just in its suggestions, was duly presented. But, like the case of many other grievances, the matter has not proceeded further than the Commission of Inquiry and Report stage.

Some two years ago, when President of the Pathological Section of the Royal Academy of Medicine, I ventured to suggest that steps should be taken to put the teaching of pathology in Dublin on a more satisfactory basis than that which at present exists. The scheme of reform proposed may or may not be practicable; but, although teachers upon whose mature judgment I would place implicit reliance thought that it or some similar measure ought to be carried out, no movement has as yet been set on foot to take the matter into formal consideration.

In England the Colleges of Physicians and Surgeons have combined to establish a research laboratory, situated on the Thames embankment, under the direction of Dr. Woodhead, complete in every detail, and available for any member of the profession desirous of making original investigations.

A British Institute of Preventive Medicine is being established in London upon the same lines as the Pasteur Institute in Paris, and that recently built by the German Government for Professor Koch. In the Institute will be made researches in connection with infectious diseases occurring in man and animals, and the modes of their prevention, and here also will be undertaken the providing of material for inoculation against such diseases as tubercle, hydrophobia, anthrax, quarter evil, cholera, &c., so that those who are interested in this special line of study will no longer have to go to Berlin, to Munich, to Breslau, or to the Pasteur Institute in Paris, to learn the methods of research employed. The Institute is being founded by public subscription, and already a sum of over £56,000 has been obtained.

How long must we wait before we have a research laboratory and an Institute of Preventive Medicine at home?

A SCHOOL OF VETERINARY MEDICINE NEEDED.

Let me mention one other matter as an illustration of our apathy in developing resources at our hand.

A short time ago I received a letter from His Grace the Archbishop asking me if it would be possible, in the interest of Irish students, to establish a veterinary school in Dublin, and if it could be organised in connection with this school. No proposition could, I think, bring home to us more vividly our want of enterprise and progress. An almost exclusively agricultural country, with an unrivalled prestige in the breeding of horses, depending for a large portion of its wealth upon animal produce of various kinds, having yearly those great shows which' under the fostering care of the Royal Dublin Society, have made Ireland conspicuous, I may say, throughout Europe, is without a school for the education of its veterinary students, who are obliged to seek in London, Edinburgh, or Glasgow the education for which no provision is made at home. Since I received the Archbishop's letter, I visited the Veterinary School in Brussels, and the Royal College of Veterinary Medicine in London, and both institutions appear to be perfectly organised. Through the kindness of Professor Shave, the Lecturer on Anatomy in the London College, I had an opportunity of inspecting both school and hospital, and noting all the facilities which were afforded to the student for the study of diseases affecting horses, cattle, and domesticated animals generally.

In addition to the School in London, there are two veterinary schools in Edinburgh, and one in Glasgow.

It would be impossible for us here, for many reasons, to organise or take up the subject of veterinary medicine. We have our hands quite full, and our resources are, unfortunately, as I think I have shown, strictly limited. I may, however, point out that the idea of the Archbishop, of having veterinary medicine taught in connection with a school of human medicine, has the sanction of high authority. The celebrated anatomist, Vic d'Azir, most strongly urged that veterinary medicine should be made a preliminary course to the study of human medicine, and that a veterinary school should be annexed to every medical college in France. This view was very strongly supported by Tallyrand, who read a paper on the subject before the National Assembly in 1790 urging its adoption. Bearing in mind the number of diseases that are communicable from animals to man, and the great advantage to be gained by the study of comparative pathology, there can be little doubt but that the establishment of a veterinary school in Dublin would have a healthy influence upon our medical school, and I hope that this aspect of the question may not be lost sight of by the profession generally. I am sufficiently sanguine to hope that now that this matter has been brought prominently under public notice, some good result may be obtained. The Vice-Chairman of the Agricultural Committee of the Royal Dublin Society, Mr. James Talbot Power, one of those who

"Do good by stealth and blush to find it fame,"

has taken up the matter warmly. The O'Conor Don, the Right Hon. C. T. Redington, Mr. C. J. Blake, the well-known sportsman, and others who take a keen interest in the breeding of horses at home, are fully alive to its importance and have promised to aid the movement, so that some good result may follow from the initiative taken by the Chancellor of our University.

Gentlemen, everything in this world comes to an end, even an introductory address. I have detained you already at an inordinate length, and I hesitate to trespass further upon your patience. But I desire to add a word or two as a sequence to what I have brought before you. We live in a period of history when political feeling runs high, and different sections of Irishmen are arrayed in fierce conflict with each other. It may not be too sanguine to hope that time, as it travels in its divers paces, may bring to us that unity which is essential for our mental, social, and material progress. Meanwhile, let us bear in mind that science knows no politics, that we as students of medicine are concerned only with what, next to religion, exacts all that is best and noblest in our nature—the care of the intellectual and physical well-being of man. If we are in earnest, the study of medicine, or even of one of the different branches of knowledge which it embraces, will guard us against a danger which is so fruitful a source of evil of every form—intellectual *ennui*. But to acquire that degree of interest in work which renders a life of labour the only one that is the source of happiness in this life, with the joyous sense of independence which reliance on oneself engenders, the work that is accomplished must be in the strictest sense *thorough*. Medicine is a hard taskmaster. Those who desire to have their names written on the pages of its history must devote themselves exclusively to its study, and carefully shut out all else that would be likely to divert their attention from that which should engross it to the fullest extent.

> "One science only will one genius fit,
> So vast is art, so narrow human wit."

ART. XV.—*Pernicious Anæmia.*[a] By JAMES CRAIG, M.D. Univ. Dublin; F.R.C.P.I.; Physician to the Meath Hospital.

A CASE has recently come under my observation in the Meath Hospital, presenting in such a marked degree the clinical features which characterise pernicious anæmia, that I have come to regard it as an example of that obscure and rather rare disease. While hunting up the literature of the subject in my endeavour to become acquainted with the most recent views as to its causation and pathology, I was surprised to find that on two occasions only communications on this disease had been brought before the Fellows and Members of this Academy of Medicine. One was made by Dr. Finny in 1884, and the second by Dr. W. R. Graves in 1889, the latter merely embracing a few pathological results which he had observed. Previous to that the Irish literature dealing with

[a] Read before the Section of Medicine in the Royal Academy of Medicine in Ireland, on Friday, November 17, 1893.

this affection was confined, as far as I can gather, to a very able paper by Dr. Purser, published in the *Dublin Journal of Medical Science* for 1877, and a lengthy and exhaustive lecture delivered by Dr. Finny in the City of Dublin Hospital, and published in the *British Medical Journal* of 1880.

If this case which you have had the opportunity of examining were one of every day occurrence, I should have preferred to wait before making my communication until either a more satisfactory result of treatment could have been recorded, or, in the event of a fatal termination, definite pathological results described. But as neither of these conditions is likely soon to be fulfilled, I thought the present occasion not an inopportune one for a discussion of the subject. And in reading this paper I must ask for your kind forbearance if I weary you with a minuteness of detail which would be superfluous in the case of a less obscure illness :—

Case.—W. W., forty-two years of age, residing in Dublin, an upholsterer by trade, was sent to me by his employer on the 5th of September last. He complained that he lost his breath while walking, got weak and faintish while at work, and giddy when he raised his head after stooping. Family history excellent, has been married for 22 years, and has eight children alive. Had scarlatina when a boy, and typhus fever 11 years ago. Was never abroad. Had a bubo 15 years ago which did not suppurate, and was not accompanied by rash or sore throat. Never suffered from jaundice, nor passed tape-worm. Has suffered from piles with occasional hæmorrhage for the last 18 years. About 6 years ago was much troubled with pain in the stomach and flatulence, which were relieved by the daily use of essence of ginger.

Some four years ago he first began to get breathless when walking on the street, and at that time he obtained admission to Steevens' Hospital, where he remained under treatment for several months. His symptoms having subsided, he went from there to the Convalescent Home at Stillorgan, from which place he returned to his work feeling stronger and in better health. This improvement continued for about 12 months, when the breathlessness returned, and his skin became "pale and yellowish." He attended a dispensary in Mark-street off and on during the next 18 months, until in the February of the present year he became a patient in the Whitworth Hospital, Drumcondra. While there he improved somewhat, and again went to the Convalescent Home, but on resuming work he soon began to suffer as previously from weakness and shortness of breath. These increased until he came into the Meath Hospital in September. He has never had epistaxis; has suffered for some years from occasional attacks of diarrhœa, but not from vomiting. About 7 months ago, once or twice a week, he became very hot at night and perspired freely. Three months ago he says his mouth was covered with white blisters. About a year ago he noticed his urine was darker than at present.

On admission his face was of a pale lemon colour; the skin dry, smooth, and waxy; areola around nipple not dark; no enlargement of glands. Mucous membrane of lips and gums very pale; finger-nails excessively white; veins on backs of hands of magenta tint; conjunctiva of a bluish white colour. Body well nourished and covered with an abundance of subcutaneous fat; no œdema; respirations 24 per min.; no cough; lungs healthy. Heart is of normal size; a hæmic murmur is audible at apex, and more distinct over pulmonary area; a loud venous hum is heard over vessels in right side of neck; pulse 96, weak and compressible. The tongue is very pale, smooth, moist, and flabby, but clean; appetite is bad; diarrhœa is present; fæces dark with offensive smell; flatulence troublesome; abdomen tympanitic; no tumour. Splenic dulness slightly increased; liver normal in size; urine normal in amount and colour, sp. gr. 1019, acid with no albumen. Temperature normal, sees well, sleeps well, but is very apathetic and answers questions slowly.

A diagnosis was not arrived at as to the cause of the anæmia, although phthisis and malignant disease were excluded, and he was ordered 4 m. doses of liq. arsenicalis, and ½ drachm doses of aromatic iron mixture to be taken thrice daily. The diarrhœa, which lasted for two days, was stopped by lead and opium pills. His breathlessness became less, and he was sent for a fortnight to the Convalescent Home in Bray, his medicine being still continued. On the 17th Oct. he returned to hospital and complained that he had gone back in his improvement, and was now as breathless as on his first admission. A diagnosis of pernicious anæmia was suggested, and accordingly an examination was made of a drop of blood drawn from his finger. It was pale and thin, and did not clot. The microscope revealed no excess of leucocytes, but the red corpuscles were few, and were either lying singly or collected in clusters. Some were normal in shape and size, but the majority were smaller than normal, and of great varieties of shape. Some were larger and paler than in health. The red cells were then counted by the hæmocytometer of Gowers, and numbered 1,700,000 instead of 5 millions to the cubic millimetre, or 34 per cent. of the normal. The amount of hæmoglobin was also determined, and was only 18 per cent. of that in health. He was put on 25m. of liq. arsenicalis daily, and his diet was restricted to 3 pints of milk daily with an egg each morning, and rice twice daily.

The blood was again examined on Nov. 4th, and the corpuscles had increased to 2,280,000 per c.mm., or 45 per cent. of the normal number.

A further examination was made on Monday last, the 13th Nov., and although the alterations in shape were not so marked as when first examined, the red corpuscles were only 2,000,000 to the c.mm., or 40 per cent. of the normal, and the hæmoglobin was still only 20 per cent. of that found in health. There was no tenderness on tapping over the sternum or long bones.

As the presence of piles, which were said to bleed occasionally, pointed to a probable cause of the anæmia, I asked Sir William Stokes to make a rectal examination of the patient, which he kindly did, with the result that three small sessile piles, about the size of red currants, were found an inch or more above the anus, and although these did not themselves bleed, the passage of the speculum caused slight oozing from the relaxed mucous membrane below them. The urine was collected on several occasions and averaged between 50 and 60 ozs. I have to thank Dr. Lapper for a careful analysis which he has made of the total amount passed during 36 hours on Nov. 4th and 5th. He found the urine of normal colour, very acid, sp. gr. 1019. Urea amounted to 1·1 per cent., or 301 grs. per diem. The total sulphuric acid passed daily as sulphates was 30·73 grains, of which 14·35 grains were in the form of inorganic sulphates, and 16·38 grains were united with indol, phenol, and skatol, and appeared as aromatic sulphates.

These aromatic sulphates amount normally to about 4 grains daily, and are only one-tenth of the amount of inorganic sulphates, whereas you will observe in this case Dr. Lapper has found their amount to exceed that of the inorganic sulphates, the proportion being gr. 1 inorganic, to 1·14 grs. aromatic. It was therefore evident that indigogen compounds were present in abundance, and the specimen of indigo blue which I hand round was obtained from 3 ozs. of urine by adding an equal quantity of pure HCl, and then carefully adding a few drops of a hypochlorite of calcium solution, and finally shaking up with chloroform and evaporating. Iron was not present. Urobilin could not be detected to any very appreciable extent, and ptomaïnes were not examined for.

The temperature has been taken daily since his return to hospital, and although it never reaches 98° F. in the morning, it rises to 99° F. each evening, and on two occasions to 100° F. Since his re-admission he has only once complained of looseness of the bowels, and on examining the fæces they were semi-fluid, alkaline, and slightly darker than normal, but not markedly offensive and without a trace of blood.

His eyes were examined, but being unable to detect any retinal hæmorrhages, Dr. Story very kindly undertook a careful examination for me, and he found that the retinal vessels were very pale, but that no evidence of hæmorrhages existed.

I cannot say that up to the present there has been any great improvement in the condition of the patient, although arsenic has been administered very freely. He says that he is not so breathless as before when he walks up and down the ward, and although I have lately noticed a tendency to a tinge of pink near the free margins of the nails, an examination of the blood has not revealed any increase of red corpuscles or hæmoglobin to account for this. Dr. S. M'Kenzie has pointed out that a universal pallor of the nails is an evidence that the corpuscular richness of the blood has decreased by 50 per cent.

In my further remarks you will have an opportunity of observing in what respects the clinical features of this case correspond to the recognised symptoms of the disease which I have assumed this to be, and in what instances they differ.

The obscure malady to which the name of Pernicious Anæmia has been ascribed has occupied for the last quarter of a century a considerable amount of attention from the medical profession both in the United Kingdom and on the Continent. True that a few scattered cases had been published before 1855, but at that date Addison first made known the fact that he had long been aware of a fatal form of anæmia, which came on slowly, resisted all treatment, and for which no cause could be assigned. He termed it Idiopathic Anæmia, and when, 16 years later, Biermer, of Zurich. published what he thought was a new disease, he called it Progressive Pernicious Anæmia, but it was in reality the same complaint which Addison had already described, and a number of which like cases had been under the care of him and his colleagues in Guy's Hospital in the intervening years. This claim of priority for the German physician in describing a new disease—a claim to which he had no just right—has caused as much annoyance to the colleagues and successors of Addison as was caused in our own country when the Germans gave to Basedow the honour of having first discovered the disease which, five years previously, had been described by Graves, and with which his name will be for ever linked.

But while the honour of discovery undoubtedly rests with Addison, the title of Idiopathic Anæmia with which he named this malady, has come to be regarded in a wider sense, and to include both chlorosis and pernicious anæmia, which are considered as primary ailments as distinct from those anæmic conditions which are simply symptomatic. The title of "Progressive Pernicious Anæmia" adopted by Biermer is now shortened to Pernicious Anæmia, as it has been found that the disease does not in all cases assume a progressive nature, but is often characterised by relapses and sometimes even by cure.

The symptoms indicative of this disease are numerous, and in most cases the illness creeps on the patient in a slow and insidious manner. Distressing breathlessness may be the only thing complained of for a length of time, but increasing weakness, pallor of the skin and mucous membranes, and in the case of the face a yellow, lemon, or faded leaf-tint, are soon noticed. The superficial veins on the backs of the hands have been observed by M'Phedran, of Toronto, to have a magenta tinge rather than the normal blue. While general weakness increases there is no wasting to correspond, but rather an increase in the amount of subcutaneous fat, which, however, may disappear towards a fatal termination. Stomatitis, vomiting, and diarrhœa are usually present, one or other or sometimes all of them being prominent, and in the case of the diarrhœa it is often of an unusually offensive character. The tongue is pale, flabby, and clean, but at times coated or raw-looking. The appetite is bad, and flatulence, with pain in the epigastrium, is present. Hepatic dulness is slightly increased. The lungs are healthy. The heart is often slightly enlarged from fatty degeneration and probably dilatation—hæmic murmurs at apex and base are common, with a venous bruit in the neck. The pulse is quick and compressible, though sometimes high tension has been noted. Hæmorrhages into the retinæ are invariably present, while epistaxis, bleeding from the gums, metrorrhagia, and even petechiæ, are not uncommon. Œdema around the ankles has been noticed. Tenderness over some of the bones has been observed.

In 1874 Professor Immermann, of Bâle, observed that pyrexia without local inflammation was an important character of "the new disease," and in the same year a case of Dr. Moxon's is recorded in "Guy's Hospital Reports" (1878), in which rigors, sweating, and high temperature occurred. Further investigations have proved that this pyrexia, rarely absent, is irregular or remittent in its course, and indeed it has been taken by Dr. Wm. Hunter as a sign that active destruction of blood is going on when the temperature rises, and he says that at such times also there is a deeper tint of the skin and a darker colour of the urine.

However, although irregular fever is common and well-marked in pernicious anæmia, we should remember that pyrexia has been observed in anæmia from excessive hæmorrhage, and commonly, to a slight degree also, in chlorosis.

In 1875 changes were discovered in the medulla of the long bones, to which I shall refer later on.

A microscopic examination of the blood was made by Wilks and others in Guy's Hospital even in the earliest-recorded cases, but save that the leucocytes were not increased, little else was observed. Leared, it is true, wrote in 1858 that the blood discs varied in size and shape. However, it was not until 1875 that Dr. Byrom Bramwell made drawings of the appearances presented by the blood when examined with the microscope, and these drawings were published two years later in the *Edinburgh Medical Journal.* In the meantime Professor Eichhorst, of Jena, had independently discovered the remarkable changes which are seen in the red corpuscles, and Quincke gave a translation of his description in the *Medical Times and Gazette* of Oct., 1876. In the following month Messrs. Mackern and Davy demonstrated similar changes from the blood of a patient in Guy's Hospital, and nine months later Professor Purser was fortunate enough to meet with a case in which the corpuscular characters of the blood were most minutely observed and recorded by him. Dr. Stephen Mackenzie, in the *British Medical Journal* of 1891, after mentioning that in this disease the sp. gr. of the blood is reduced from 1050 to 1038 or 1028, that its alkalinity is lessened, and that the solids of the plasma are greatly diminished, classifies the alterations that have been noted in the red corpuscles under six heads—1. Their cohesiveness is modified, so that rouleaux are seldom seen, and the corpuscles are either arranged singly or collected in clusters. 2. They are greatly reduced in number; instead of averaging 5,000,000 to the cubic millimetre, their number may fall to $1\frac{1}{2}$ millions, or sometimes, even before death, to 360,000. 3. Poikilocytosis, or alterations in the shape of the corpuscles, though found occasionally in chlorosis and other anæmic affections, and though sometimes absent in this disease, is very marked. Some of the cells are the normal biconcave discs, but the majority are ovoid, pear-shaped, battledore, rod-shaped, cup-shaped, or, finally, of irregular outline. 4. Their size presents great variations; large numbers of small cells are seen—microcytes, and this condition, though present in all varieties of anæmia, is more common in pernicious than in the other forms. On the other hand, megalocytes, or cells larger than the ordinary ones, are especially characteristic of this disease. Nucleated red corpuscles have also been occasionally observed. 5. The vulnerability of the corpuscles is increased—in other words, they more readily give up their hæmoglobin. This is proved by observing with the microscope the colouring matter separating from the stroma, and by noting that in a few hours crystals of hæmoglobin form in a drop of blood placed on a slide without any reagent being added, as shown by Copeman, but this latter condition was not found by Mott. 6. The hæmoglobin capacity of the red corpuscles is greatly increased. This, I do not think, has been sufficiently verified from the recorded cases, to entitle it to be given as a definite statement. Numerous instances are doubtless recorded where the percentage of corpuscles had fallen to 30 or 40, while the hæmoglobin was still present to 60 or 80 per cent. In these cases the corpuscles represented twice their normal value, but also in a great number of cases the value of the coloured cells had only been one-half of the proper amount, and this latter condition is what my patient's blood reprsents. However, when a comparison is made with chlorosis in this respect, a marked difference exists. In chlorosis a great deficiency in hæmoglobin out of all proportion to the number of cells, which, indeed, may be only slightly decreased, is a special characteristic of the disease, while in pernicious anæmia the hæmoglobin bears a more equal relation to the number of cells, and is often greater individually than in health.

In addition to the characters of the blood just enumerated, one observes, from a drop on the finger, its pallor, thinness, and tendency to run off the finger rather than to clot.

With regard to the urine, it has been found normal in amount, of low sp. gr., acid in reaction, deficient in urea, and generally free from albumen, bile, and sugar. In many cases its colour is of the usual amber tint; in others it has been found darker than that of health. But of late years much importance has been attached to the discovery of the following additional characters—namely, excess of iron, increased and abnormal urine pigments, blood pigment, increase of the aromatic sulphates, and finally the presence of ptomaïns. And these conditions I shall now briefly consider in detail, and endeavour to point out the significance attached to their presence and the causation theories adduced therefrom.

In the case recorded by Dr. Purser he had noticed that the urine during life was darker than normal, and on finding after death that the epithelium of the convoluted tubes in the kidneys contained a granular pigment which gave an iron reaction, he greatly regretted that he had omitted to examine the urine for iron, for he concluded that the iron pigment present in the kidneys was derived from the blood, that it was undergoing elimination through the renal convoluted tubes, and thus darkened the urine by its presence. This suggestion was subsequently acted on by Dr. Finny, and it was found that one of his patients, while not under treatment by iron, had eliminated about one-third of a grain of this metal in 72 ounces of urine. This, of course, pointed to an active blood destruction, but by taking into consideration the altered appearance of the red corpuscles, and from the definite changes which had been observed by Cohnheim and himself in the medulla of the long bone—a change in which the yellow fat was replaced by a variety of coloured and colourless corpuscles—Dr. Purser arrived at the conclusion that probably an imperfect formation, and almost certainly an increased destruction of the red corpuscles, takes place in the bone-marrow. Professor Pepper, of the University of Pennsylvania, had first observed the abnormal appearance of the bone-marrow, and had put forward the theory that pernicious anæmia was merely a medullary form of Hodgkin's disease.

However, an advance towards a fresh theory was made when Dr. Wm. Hunter, acting on the discovery that in many cases the liver-cells of the portal area were deeply stained by iron re-agents, made a quantitative estimate of the amount of free iron contained in the liver and spleen. The normal amount he found to be ·083 per cent. in the liver, and ·171 per cent. in the spleen after these organs had been freed from blood. On the other hand, in pernicious anæmia he found that the liver contained more than seven times as much as in health, while the normal quantity was scarcely reached in the case of the spleen. In other words, the liver, which in health yielded only one half of the amount obtained from the spleen, contained three times the splenic amount in the disease under discussion. Dr. Hunter, therefore, concluded that an active destruction of blood was going on in the body, and that the liver was the chief seat of this hæmolysis. But when the pigments found in the urine came to be analysed and traced to their origin, fresh difficulties arose. It was then seen that the dark colour of the urine was not due to the presence of iron but to *pig-*

ments which were free of this metal. The colouring matter of urine in health was shown to be urobilin, which M'Munn believes is produced by the action of nascent hydrogen on hæmatin in the tissues, and not, as is more commonly supposed, derived from the reduction of bile pigments in the intestines. However, the urine in pernicious anæmia owes its deeper colour, according to M'Munn, to pathological urobilin which is of a darker colour than the normal variety, and this pigment he considers to be derived from stercobilin in the following manner. Bilirubin and biliverdin are formed in the liver from effete hæmoglobin, and pass on as constituents of the bile into the intestines. The hæmoglobin and histo-hæmatin of the meat taken as food also find their way to the intestines, and they along with the bilirubin and biliverdin come under the influence of the putrefactive ferments of the intestinal canal, with the result that stercobilin is formed from them, and, probably at the same time, ptomaïns are also formed by the action of these putrefactive ferments on the proteids. Part, then, of the stercobilin may pass on with the fæces, but part is also taken up by the portal capillaries of the intestines, and after undergoing reduction changes, is finally excreted as pathological urobilin. The ptomaïns are probably also absorbed at the same time as the stercobilin, and being present in the blood, are excreted by the kidneys, and their presence has been demonstrated in the urine.

Now this abnormal urinary pigment together with the ptomaïns, would accordingly point to an excessive putrefaction in the intestines, and that such is the case Hunter endeavoured to prove in a different way. He turned his attention to the excretion of sulphates. In health the sulphates taken with food appear in the urine as inorganic sulphates of sodium and potassium, but during the pancreatic digestion of proteids, if this be prolonged, decomposition sets in owing to the presence of organised ferments, and the aromatic substances, indol, phenol, and skatol are formed. The skatol mainly passes on with the fæces and is the chief cause of their fæcal odour, but the indol and phenol unite with the sulphur set free from the proteids, and, combining also with potassium, they form potassium indoxyl sulphate (the so-called indican of the urine) and potassium phenyl sulphate, and these are excreted in the urine as aromatic sulphates. Hence, in health there are two forms of sulphates passed in the urine—inorganic and aromatic. Now the total daily excretion of all the sulphates when determined by the quantity of sulphuric acid passed, amounts to some 44 grains in health, 4 grains being aromatic, and 40 grains being inorganic compounds, or a proportion of 1 aromatic to 10 inorganic. But if putrefaction in the intestines exceeds the normal, the aromatic principles derived from indol and phenol will be increased in the urine but not the inorganic, which, indeed, will be lessened owing to the diminished consumption of food. In pernicious anæmia Hunter found this variation to be the case. While the entire sulphates were diminished, he found on one occasion that the relation, instead of being 1 to 10, was 1 of aromatic to 3 of inorganic; and as further proof of this, Dr. Lapper has shown that in the case of this patient of mine the aromatic sulphates even exceeded the inorganic in amount. This, at all events, proved that an excessive putrefaction was going on in the intestines, but the slight difference in the relation of these principles when taken as an index of the amount of putrefaction, did not satisfy Hunter. He did not consider that the amount of putrefaction present would represent enough putrefactive products to account for the active destruction of blood which the excess of iron and pigment found in the urine represented. Accordingly he turned his attention to a search for ptomaïns in the urine, and he succeeded in demonstrating not only the presence of putrescin and cadaverin, which are the normal products of putrefying meat and which are not poisonous, but in addition to these he discovered the presence of an unknown ptomaïn, which he considers may be of a poisonous nature, and from this he concluded that in addition to the ordinary ferments of putrefaction in the intestines, there are also *special* micro-organisms present in this disease, which by their action produce ptomaïns of a poisonous nature, and that these in their turn act indirectly as destructive agents on the blood. I have already stated that he felt assurred this active destruction of blood took place in the liver on account of the abnormal amount of iron which it contained after death, but on this point he subsequently corrected himself by very patient experiments.

He first proved that in health the daily destruction of blood is accomplished by the activity of the white corpuscles, but more especially by the activity of the lymphoid cells of the spleen, and to a less degree by the activity of the lymphoid tissue which surrounds the capillaries in the gastro-intestinal mucous membrane. He then distinguished between a direct and an indirect destruction of corpuscles; by injecting pyrogallic acid into the blood the cells were directly injured and gave up their hæmoglobin which appeared immediately in the urine as hæmoglobinuria. This direct action was not present in pernicious anæmia, but by the injection of toluylene-diamine in animals, he was able to bring about a condition similar to what is found in this disease, and the effects of this drug were of an *indirect* nature, increasing, as he supposed, the normal activity of the lymphoid cells of the spleen and gastro-intestinal mucosa—in other words, that an exaggeration of the normal process of blood destruction had taken place under the influence of toluylene-diamine. In such an indirect way, also, does he consider the poisonous ptomaïns to act in pernicious anæmia, so that this disease would be of a toxæmic character, and he now regards the function performed by the liver to be of a merely excretory nature; and by means of it and of the kidneys the effete hæmoglobin is partly stored up in their cells in the form of iron, and partly eliminated as iron and pigment in the urine. In order to give a fuller picture of Hunter's teaching I should add that he considers the presence of worms, catarrh, ulceration, &c., in the intestines as predisposing elements to the favourable growth of the special micro-organisms to which the poisonous ptomaïns owe their origin. And he considers that these toxic ptomaïns are absorbed in an irregular manner, and that when an excessive absorption takes place symptoms of toxæmia appear, accompanied by evidences of an increased destruction of blood. The evidences of toxic poisoning are those of rigors, sweating, high temperature, prostration, drowsiness, and even delirium and coma. The evidences of blood destruction are the deeper tint of skin, the darker colour of the urine, and a diminution in the number of blood corpuscles. In order to prove whether these toxic symptoms were of common occurrence, Dr. Hale White has examined the records of 30 cases which were treated in Guy's Hospital, and although in some of these delirium and coma preceded death, in only one instance was there a record of sudden onset of fever, with rigors, sweating, and drowsiness, so that Dr. White is of opinion that, on the whole, the evidence of toxæmia is slight.

And with regard to the colour of the urine, Dr. Stephen Mackenzie and Dr. Hale White have each concluded that, although the urine is frequently high coloured, in many cases it is not so.

Having explained the views of Pepper, Purser, and Hunter as to the nature of this disease, I shall now relate the views which others have expressed.

Addison and the early writers on the subject believed fatty degeneration of the heart to be the cause of the malady, and this was rather an effect than a cause.

Fenwick, from finding an atrophied condition of the gastric glands, based on that a causation theory, but intestinal lesions have been so seldom found that much value cannot be attached to them.

Pye-Smith, in 1882, says it depends on a too rapid and extensive destruction of the red blood corpuscles. Delépine and Mott would look on it as a disturbance of one of the normal functions of the liver—a function which may be compared to its glycogenic function—and a disturbance of which produces increased hæmolysis, just as a disturbance of the glycogenic function produces glycosuria. Mott further suggests that this perverted action on the part of the liver may be due to the absorption of some substance from the alimentary canal. Peptone, for instance, if not changed when absorbed, might give rise to increased hæmolysis, or chemical products of putrefaction might cause it. However, with the marrow changes in his mind, he finally sums up by expressing his conclusions as follow: that an excessive hæmolytic process of a progressive and remittent character occurs for no proven or ascertainable reason, leading to an attempt on the part of the blood-forming tissues to repair this excessive waste, and often eventually determining a reversion to the embryonic type of blood-formation in the marrow and spleen.

Hunter, whose views are more recent, has shown that the hæmolysis does not take place in the liver, but in the spleen and gastro-intestinal mucous membrane.

Before speaking of treatment I should like to point out that, in favour of my diagnosis in the present case, there are—the very grave anæmia, without evident cause, the changes in the red corpuscles of the blood, the improvements and relapses, extending over a period of four years, the excessive breathlessness and weakness, without pulmonary complication or dropsy, and with a large amount of subcutaneous fat, the slight exacerbations of pyrexia and cardiac murmurs, loudest over the pulmonary area, and of varying intensity; while, as opposed to this diagnosis, there are—the absence of retinal hæmorrhages (which, it is true, are not universally present in pernicious anæmia), the absence of iron and urobilin in the urine, and the presence of cardiac murmurs, which might be taken to represent valvular disease of the heart. Now, with regard to the urine, although iron is generally admitted to be present, it is not so with urobilin. In Byrom Bramwell's eight cases the urine was either very pale or normal, and the search for urobilin has been limited to recent cases. In this case the urine was darker a year ago, and at the time of analysis arsenic had been administered for nearly two months. In considering the question of a cardiac lesion, even if the murmur was granted to be of valvular origin, the fatty degeneration and dilatation of the heart arising from the anæmia would account for it: and although I am fully aware of the extreme anæmia which often accompanies cardiac lesions in children, I do not think the extreme degree which is present in this case is ever found in adults— at all events without other signs to confirm it.

I now pass on to the treatment of this disease. Dr. Stephen Mackenzie, in his Lettsomian Lectures on Anæmia delivered in 1891, says: "The position to-day is but little altered since Addison said of it, that, with scarcely a single exception, it was followed after a variable period by the same fatal result."

Undoubtedly many cases of recovery have been recorded, but it is too often only of a temporary nature, and it would be interesting to hear the experience of those who have followed up cases of apparent recovery during subsequent years.

The general treatment includes keeping the patient in the open air and sunshine when possible, rest, massage, and a farinaceous and milk diet. With regard to medicinal treatment, arsenic has been credited with numerous cures, but many cases remain wholly unbenefited by its use.

Dr. Byrom Bramwell and Dr. Finny, who were the first to give this drug a trial, met with more success than has since been observed from its administration. Although I have been using it for two months in the present instance, the results are disappointing, but still there is no doubt the corpuscles have become more natural in shape.

Hunter recommended beta-naphthol on account of its strong antiseptic properties. In some cases it seemed to do good. I intend to use it as soon as I am satisfied that the arsenic has had a fair trial, and from the amount of putrefaction which was shown to be present from the indican and sulphates of the urine, I should think antiseptics would prove beneficial. Dr. Duffey informs me he has used thiocamf as an antiseptic with some success in a case which is under his care at the present time. Quinine has been given during the pyrexial attacks. Phosphorus and mercury have also been used. Oxygen inhalations have been said to improve the patient's condition. Transfusion of blood has been repeatedly tried, and with benefit, perhaps, in a few cases, but oftener it seems to have hastened the end.

Dr. Brackenridge. of Edinburgh, has recorded, in the *British Medical Journal* of July, 1892, the result of this method of treatment in some cases where arsenic had been a failure. The result encouraged him to give future cases a trial of it. He believes the cause of the disease to be a faulty blood genesis, and he hopes by transfusion to give the blood-forming organs an impetus which would bring them within the curative effect of arsenic.

Art. XIV.—*Waterlogged Dublin.* By William R. Graves, L.R.C.S.I., &c.; Pathologist to the City of Dublin Hospital; Member of the British Institute of Public Health, &c.

While the inhabitants of Dublin are looking this way and that for water to drink, and are even, in some instances, obliged to purchase water for this purpose, it is interesting to learn that the level of the *subsoil* water has in no way diminished,[a] and is still as high as it possibly can be, after the long and dry summer and autumn.

The Report of the Typhoid Fever Inquiry Committee, which was laid before the Dublin Corporation in August, practically places the stagnant, polluted, high level subsoil water in the front rank as a factor of typhoid fever in Dublin.

The rapid strides of sanitation in Dublin, and the improvement in both private house drains and public sewers within the last ten years, accompanied, as these improvements are, by a steady increase of the typhoid fever death-rate, make it necessary to search more closely in Dublin for the causes of this increase. Clearly it cannot be the drains, for, while it cannot be doubted that individual faults in house drains or portions of public sewers will, in Dublin as elsewhere, lead to disease and death, we must look for some other cause for the steady increase of the disease in the city. It may be better, here and at once, to freely admit that

[a] Sir Charles Cameron tells the writer that, in consequence of the Typhoid Fever Inquiry Committee's Report laying so much stress on the high level of subsoil water, the Public Health Committee have instructed Mr. Spencer Harty to establish observation wells, and that he has four wells now under observation in different parts of the city. The water in each of these wells is as high as it possibly can be.

the water carriage of sewage, dangerous everywhere, is peculiarly dangerous in Dublin, where there is a permanent high level of subsoil water, and where there is no system of subsoil drainage. The gradual slope of the surface towards the river insures that the subsoil water, having no vent, shall be always at as high a level as it possibly can be. The city is, however, now committed to the water carriage system, and the sanitary authorities must render it as little harmful as possible by providing ample drainage for the subsoil. Were this water pure, and uncontaminated by sewage, it is quite probable that it could not then be charged with more than increasing the malarial and rheumatic troubles of the inhabitants, and increasing the death-rate from phthisis; but, as it is sewage-polluted by leakage from drains and sewers conveying typhoid germs, it must be taken seriously into account as a factor of the high death-rate from this disease. For what does the typhoid bacillus want to enable him to become dangerous? Free dilution by water.[a] Once he gets this, he is ready to pass off from the surface[b] of the water, and to spread the disease through any of the channels mentioned in the Typhoid Fever Report.

Taking the high level of subsoil water as an established fact, its pollution by sewage being also admitted, and its stagnation being incontrovertible, it requires no spirit of divination to estimate the effect of such a condition on the health of the Dublin citizens.

Concentration of this subsoil water would mean that as it increased in specific gravity, the dangerous matters from the sewage would float more and more to the surface, and so more and more spread the disease. Nor is typhoid the only disease which the citizen need fear: whatever is true of typhoid fever is true of cholera,[c] and probably of other diseases also. Now, unfortunately for Dublin, the various improvements in sanitary matters which have been for some time in progress, and are still going on, all tend to concentrate the subsoil water, and to direct it to discharge its gases under the houses. The causes of increased stagnation and concentration of subsoil water are as follows:—

1. *Less addition to Subsoil Water.*—The waterproofing of the surface of the streets by the excellent pavement, of which the

[a] See Report by Prof. M'Weeney—Typhoid Fever Report. Dublin. 1893.

[b] It is probable that the sewage floats on the surface of the partially brackish water which lies under the low-lying areas of the city.

[c] "The Prevalence and Distribution of Cholera in Dublin, 1866." By T. W. Grimshaw, M.D. Dublin Journal of Medical Science, 1878.

citizens are so justly proud, is, from a subsoil water point of view, in Dublin, an element of danger as long as the subsoil water level is high. The pavement prevents the addition of fresh rain-water to the subsoil, and so helps stagnation—less fresh water is added to the subsoil, and so there is less change. Now it only remains to prove that less water is taken from the subsoil to prove the concentration of the subsoil water.

2. *Less Subtraction from Subsoil Water.*—(*a.*) The sewers, connecting drains, and house drains, all of which formerly drained the subsoil, are daily being made more and more watertight, and, therefore, drain the subsoil less and less.

(*b.*) Evaporation is checked by pavement.

(*c.*) The inhabitants have ceased to pump the water out of the ground.

Consequently, owing to No. 1, less rain gets down to dilute the stagnant water; and, owing to No. 2, less water is drained away. Not only is this the case, but, evaporation being checked by the waterproof street pavement, almost all the evaporation is compelled to take place through the house basements.

Thus summer and winter the unfortunate citizen is subject to the baneful influence of the putrid water that lies under his feet. In summer the sun, instead of acting as the scavenger and purifier, which Providence intended it should be, by warming up the street surfaces drives gases into the houses.[a] It is evident that if the water was within a few feet of the surface it would be much more heated, and therefore more dangerous than if it were, say, twenty feet below the surface of the street. In winter the fires draw the gases into the basements, and then the typhoid bacillus works his wicked will in milk and food stored in the pantries, &c. No doubt concrete, so long as it does not crack, will afford a certain amount of protection in a house basement.

The writer has already pointed out in "Typhoid Fever and How to Avoid It,"[b] that "much confusion has been created by the statement that in certain cities when the ground water is high typhoid fever-rate is low, and *vice versa.* This relates really to the drinking water from wells, which when they are low are dangerous, and when high have good water in them."

Dublin must be judged for itself, and in Dublin a high level of

[a] Dr. Tatham in Manchester has found that, when the ground temperature at a depth of four feet from the surface rises to 56° F., summer cholera becomes an epidemic.

[b] Health Record. January, 1892.

subsoil water must ever be a source of danger to the public health, and must tend to lower the health of all. The increase of typhoid fever keeps pace with the increase of stagnation and concentration of its polluted subsoil water, and is in inverse ratio to the improvements in sewers and house drains.

It has been suggested that pumping the subsoil water might be "pumping the Liffey into the Liffey;" but this is not the case, as in many places where the water is high there is little or no movement of the level with the rise and fall of the tide, and even if it were the case it would be a fortunate opportunity of washing the polluted subsoil. Such pumping as has been carried out has been of benefit. The pumping engine in Trinity College has, for over twenty years, kept down the level of the subsoil water within the College enclosure, and since its erection no epidemic of typhoid fever has ever broken out within the walls. The windmill pump, which worked in the North Lotts for a year and a half, at the end of the tunnel which was being made under the Liffey, *drained the subsoil as far away as Summerhill.*

Experimental pumping might be carried out at once without much cost. A portable engine working a portable pump could easily be placed where the water was found to be high, and where the fever-map pointed out that its services were most required. Six months pumping would tell its tale in the district.

A mere geological map of the city area throws no light on the problem of draining the city. Glacial drift of alternating mud and gravel, with a total depth varying from 50 to 200 feet, overlie the primary rocks. The promiscuous way in which mud and gravel crop up throughout the city, makes it difficult to predict where the pumping could most successfully be carried out; but this, after all, is an engineering question, and presents no real difficulty.

In summing up, three elementary propositions present themselves:—

1. Typhoid fever was introduced into the city principally by the watercloset system of sewerage.[a]

2. Typhoid fever has become endemic in Dublin through the leakage of the sewers and drains into subsoil water, which is at a high level.[b]

[a] See Report, Royal Sanitary Commission, Dublin, 1879–80, and Report, Typhoid Fever Inquiry Committee, 1893.

[b] See Report, Typhoid Fever Inquiry Committee. 1893.

3. In the foregoing it will be seen that the increase of typhoid fever in Dublin corresponds with, and is in proportion to, the concentration of the high-level polluted subsoil water, such concentration being at inverse ratio to improvements in drains, sewers, and pavements.

The typhoid fever death-rate is higher in the waterlogged area, and lower in the remainder of the city,[a] than when reported by the Registrar-General and Sir Charles Cameron[b] for the years 1882 to 1887—as, waterlogged area, 1 in 365; remainder of city, 1 in 531. The improvement in drains and sewers in the area not waterlogged has lowered the death-rate from this disease in this area, while the waterlogged area is going from bad to worse.

Art. XVII.—*Large Coagulum adherent to the Mitral Valve in a Case of Acute Rheumatism fatal through Hyperpyrexia.*[c] By John W. Moore, M.D., Univ. Dubl.; F.R.C.P.I.; Physician to the Meath Hospital.

On Monday, October 9, 1893, Thomas S., aged twenty, a recruit in the Dublin Metropolitan Police, was admitted from Kevin-street Barracks to the Meath Hospital under my care. When admitted, he complained of constant pains in both knees and in the ankle-joints, which were swollen and tender on pressure. The pains were much increased on moving the limbs. The right shoulder was also affected, and, in addition, he complained of sore throat as well as of a feeling of tightness over the precordial region.

Mr. Francis W. Goodbody, clinical clerk, and Mr. E. A. Bourke, the case-taker in charge, to whom I am indebted for very full notes, ascertained that the patient had been ailing for at least a week before admission, the chief symptoms being nausea and vomiting of food. On the Saturday evening previous to his admission (October 7) he had a shivering fit, which he attributed to a chill caught while at drill on the morning of the day named. Next day (Sunday) he was obliged to stay in bed, and suffered from severe shooting pains in his back.

His past medical history was that as a child he had an attack

[a] See Supplement. Report, Typhoid Fever Inquiry Committee. 1893.

[b] Distribution of Enteric Fever in Dublin. T. W. Grimshaw, M.D., and Sir Charles Cameron. 1888.

[c] Read before the Section of Pathology of the Royal Academy of Medicine in Ireland, on Friday, November 3, 1893.

of scarlatina, and in May and June, 1891, he was laid up with an attack of rheumatism, which affected chiefly his knees and ankles.

On the evening of his admission his pulse was 86, the respirations were 26, and the temperature was 102·8°.

On examination next morning a well-marked systolic murmur was heard over the mitral area. There is no note as to the presence or otherwise of a presystolic murmur, but there was no valvular thrill, nor could any evidence of pericarditis be detected. The tongue was thickly coated. The urine was concentrated, dark-coloured and turbid from urates. There was unusually profuse sweating, the sweat having an intensely sour smell and an equally striking acid reaction. The patient seemed to be very uneasy and anxious about himself.

The affected joints were wrapped up in absorbent cotton wool, he was clad in flannel, a small blister was applied over the region of the heart, and he was put on fair doses of salicylate of sodium.

The temperature fell steadily to 99·6° on the morning of Thursday, October 12, and to 98·6° on the morning of the 13th; but, notwithstanding, the patient was evidently not doing well. He complained of great thirst, and although the pain in the shoulder had disappeared he suffered intensely from pains in his right knee and ankle, and passed a sleepless night.

On the afternoon of Friday, the 6th, the patient's legs and feet became quite numb and cold, so that Mr. Alfred Power, the House Surgeon, stopped the salicylate treatment and gave quinine, digitalis, and opium in combination in a pill.

Early on Saturday, the 14th, temperature rose to 101·0°, and the heart's action became both quick and violent, while the pulse at the wrist was felt with difficulty. There was profuse sweating, especially about the face and chest. In the evening the temperature was 103°, and the patient was losing consciousness.

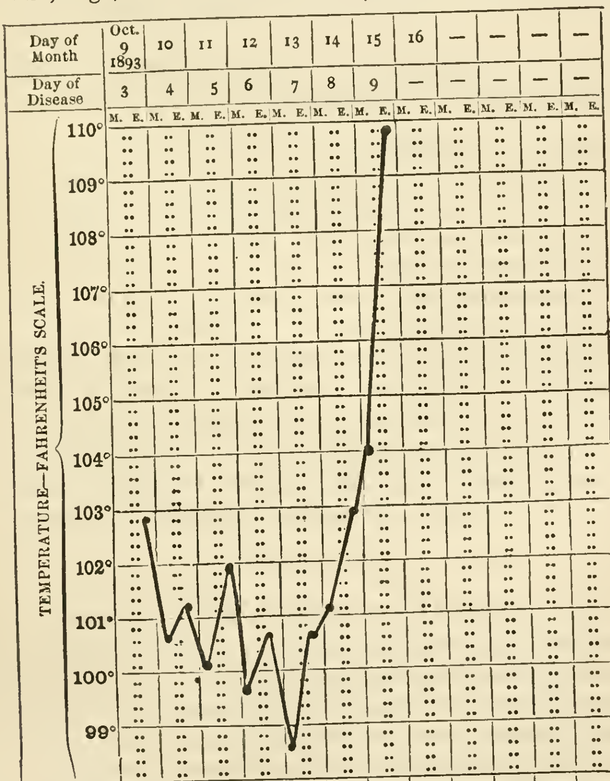
On Sunday morning, the 15th, everything had changed for the worse. The thermometer stood at 104°. The tachycardia was more pronounced, and dyspnœa had set in, assuming to some extent the character of Cheyne-Stokes respiration. The feet and legs were quite cold, but the trunk was burning hot.

As it seemed risky to put him into a cold bath, or to apply the ordinary wet pack, he was wrapped in wet towels. At 3 45 p.m. the temperature read 106·6°. It was afterwards taken hourly until death occurred shortly after 11 30 p.m., with the following result:—

6 p.m.—107·0°.
7 „ —108·0°.
8 „ —108·2°.
9 „ —108·2°.
10 „ —108·4°.
11 „ —108·6°.
12 midnight.—110·0°, nearly half an hour after death.

Clinical Chart of Temperature, &c.

T. S.; Age, 20; Disease, *Acute Rheumatism;* Result, *Death.*



Pulse {M. / E.	— / 86	80 / 92	80 / 90	83 / 92	80 / 106	74 / 120	132 / 140?	— / —	—	—	—	—
Resp. {M. / E.	— / 26	24 / 24	23 / 26	24 / 28	24 / 32	24 / 30	39 / 58	— / —	—	—	—	—
Motions	—	—	—	—	—	—	—	—	—	—	—	—

A *post-mortem* examination was made on the morning of Monday, October 16, by Mr. E. E. Lennon. The lungs were healthy. The liver was slightly full, and rather soft. There was no trace of pericarditis, or of recent endocarditis. The heart was hypertrophied, but distinctly softened. A little atheromatous change was observed at the usual situation a few lines above the aortic valves. These were themselves quite healthy. A large clot closely adhered to the mitral valve, blocking up its lumen to a very considerable and serious extent. This large clot was apparently of old standing. It probably dated back to the previous attack of acute rheumatism in the spring of 1891. At all events it is hardly possible that it could have developed during the patient's fatal illness.

Professor J. A. Scott was good enough to examine the specimen at my request, and I have received the following note from him:—

"I find that the vegetations on the mitral valve in your case consist of a blood clot. I was unable to make an extended examination on account of the specimen not being properly hardened, and as I did not care to damage the appearance of the specimen by cutting away a portion when it could be done most usefully.

"If it is thought well, this can be done subsequently."

Dr. Scott suggests that the sequence of pathological phenomena was—an attack of rheumatic endocarditis, involving the margin of the mitral valve, an escape and consequent perishing of leucocytes, which excited fermentation, and caused coagulation of the blood, thus leading to the formation of this great clot, which resembles a vast valvular excrescence, outgrowth, or vegetation.

THE ELEVENTH INTERNATIONAL MEDICAL CONGRESS.

The Executive Committee has decided, at its meeting on November 12th, that the Eleventh International Medical Congress, which had been postponed by resolution of August 2nd, 1893, until April of the following year, should take place in the period from March 29th to April 5th, 1894. The Committee has already taken the necessary measures to secure convenient accommodation at usual prices for the visitors, and nothing is being left undone to make the most satisfactory arrangements and to ensure the complete success of the meeting.

PART II.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

Lectures on the Comparative Pathology of Inflammation, delivered at the Pasteur Institute in 1891. By ELIAS METCHNIKOFF. Translated from the French by F. A. STARLING and E. H. STARLING, M.D. London: Kegan Paul, Trench, Trübner & Co. 1893. Pp. 218.

THE conclusion to which all the facts and arguments in these lectures lead is as follows:—"Inflammation generally must be regarded as a phagocytic reaction on the part of the organism against irritants. This reaction is carried out by the mobile phagocytes sometimes alone, sometimes with the aid of the vascular phagocytes, or of the nervous system.

"This theory is based on the law of evolution, according to which the properties that are useful to the organism survive, while those which are harmful are eliminated by natural selection. Those of the lower animals which are possessed of mobile cells to englobe and destroy the enemy survived, whereas others whose phagocytes did not exercise their function were necessarily destined to perish. In consequence of this natural selection the useful characteristics, including those required for inflammatory reaction, have been established and transmitted, and we need not invoke the assistance of a designed adaptation to a predestined end, as we should from the teleological point of view."

The fact that the reaction frequently fails in its endeavour to destroy the invader, that animals succumb to the attacks of microbes and other irritants, shows that the reactive apparatus is not yet perfected, but is still undergoing development. Starting with the idea that infection is a struggle between two organisms, and that the organs of attack and defence are objects of zoological study, it follows that comparative pathology is a branch of zoology. As a zoologist the author writes.

In the unicellular organisms traumatic lesions are quickly recovered from. Examples are given of this in the case of

Amœba, Actinophrys, Stentor, and Vaucheria. But these simple organisms are subject to infection by parasites, both animal and vegetable, and numerous cases are recorded of this, in some of which the parasite is destroyed and ejected or digested, while in others the invaded organism succumbs.

Passing to the multicellular organisms, we have first a series of most interesting observations on the behaviour of the plasmodium of myxomycetes. If a foreign body such as a piece of glass tube is pushed into the protoplasm, it is englobed, retained for a time, and then ejected as any other indigestible body would be. If irritants, mechanical or chemical, be applied to the edge of the plasmodium the protoplasm quickly moves away, leaving the injured part behind. On the other hand, certain substances exert an attractive influence on the protoplasm which moves towards them. Here we have a remarkable fact—namely, sensibility of the protoplasm as manifested by what is now termed negative and positive chemiotaxis. This sensibility, which is obviously analogous to that of man and the higher animals, obeys like them the law of Weber. It is very commonly met with in lower organisms, both animal and vegetable, and is manifestly of general importance. In the capability which the plasmodium of myxomycetes possesses of ejecting indigestible substances, of digesting other substances, and of moving away from injurious agencies, it has powerful means of protecting itself.

In the higher plants we meet with nothing analogous to inflammation. In these the thick cuticle and cell-walls are the protective organs, and if these are not able to keep out the irritant the invaded cell dies, while the neighbouring cells may multiply and form a scar or hypertrophic growth.

The great gap separating the protozoa from the metozoa is bridged over to a certain extent by the embryonic forms of sponges, medusæ, &c.—where the larva consists of two layers only, an outer enveloping layer and an inner layer, forming either a parenchymatous mass of amœboid cells, or an epithelial layer surrounding a digestive cavity. The former is known as the phagocytella stage, the latter the gastrula. The former is analogous to certain colony-forming Protozoa, the protospongia. In both cases the inner amœboid cells are able to englobe solid bodies.

In the sponges, which consist of three layers, the cells of the mesoderm have the power of englobing and digesting solid bodies. The digestion does not seem to be of a peptic nature, as it is unaccompanied by formation of acid. Foreign bodies introduced into the sponges are surrounded and englobed by the mesodermic phagocytes, and may be used to build up or strengthen the skeleton. Although living organisms are commonly seen in the cells of sponges, real parasites, with the infectious diseases they bring in their train, have not been discovered. While in sponges the phagocytic properties are confined to the endoderm and mesoderm, the cells of the ectoderm possess sensibility to the composition of the surrounding medium, and refuse to open their pores to harmful substances.

In Cœlenterata, Echinodermata, and Vermes, we find the same phagocytic reaction against irritants manifested by the cells of the mesoderm. In these groups there are no or few white corpuscles in the blood, and they take little or no part in the reactive process; but in the higher invertebrates—Arthropoda, Mollusca, and Tunicata—we find that an accumulation of white corpuscles takes place around any injured spot or about parasites. Indeed, it was in the small crustacea that the process of phagocytosis was first clearly followed by the author. The accumulation of leucocytes is facilitated by the lacunar circulation existing in these animals. In some cases, where the sensibility of the phagocytes remains negative, and a favourable condition consequently exists for the invasion by parasites, the animal is protected by a thick chitinous integument in a manner analogous to that in which nematoids and plants are defended.

Passing to the vertebrates—amphioxus, which possesses no blood corpuscles, and is protected by a tough limiting membrane, seems incapable of inflammatory reaction to injuries.

In the embryos of axolotl and of triton experiments are described, in which the edge of the fin was touched with nitrate of silver and the subsequent events watched. While the fixed connective tissue cells underwent only insignificant changes, and took no part in the process, an accumulation of amœboid cells of the mesoderm took place at the spot injured, and this without any alteration in the vessels or diapedesis of corpuscles. Hence is clearly demonstrated the possibility of an inflammatory reaction in vertebrates without the intervention of the vascular or nervous system—" Thus a genealogical tree of inflammation can be drawn up, starting with the researches on the reactive phenomena of the invertebrata, and completed by facts observed in the embryonic and early larval stages of vertebrates. These facts prove that the reactive phenomena ensuing in lesions are in their origin essentially the same in the two great branches of the animal kingdom. But, whereas in the invertebrates the processes have remained stationary, in the vertebrates they have become, in the course of development much more complex in character. Even in the older larvæ of triton and axolotl, which are provided with a larger number of blood-vessels wide enough to allow the passage of leucocytes, the inflammatory reaction takes place in the classical manner that has been so frequently studied during the last twenty-four years. The same lesions still produce an acceleration, then a slowing of the blood-stream, followed by an accumulation of white corpuscles in the peripheral zone, and their emigration and movement towards the injured spot."

Even when the phagocytic action is mainly carried out by emigrated blood corpuscles, the amœboid cells of the connective tissue also take a part and move towards the seat of injury. The supposed phagocytic action of the fixed connective tissue cells is now believed not to exist. Fixed connective tissue cells, containing coloured particles, are now believed to be derived from amœboid cells, which in an earlier stage were phagocytic and englobed the foreign particles, and then underwent development into stationary cells of the tissues:—"It is apparent that the inflammation of vertebrates, in which the defending phagocytes emigrate from the vessels to proceed against offending bodies, is distinguished only quantitatively from the analogous phenomena in invertebrates, and must therefore be also regarded as a reaction of the organism against deleterious agents. We must conclude that the essential originating factor, *the primum movens of inflammation, consists in a phagocytic reaction on the part of the animal organism.* All the other phenomena are merely accessory to this process, and may be regarded as a means to facilitate the access of phagocytes to the injured part."

Four varieties of white blood corpuscles have been described:— 1. The small mononuclear cell, or lymphocyte; 2. The large mononuclear cell, a later stage of 1; 3. The multinuclear cell or so-called neutrophile leucocyte; and 4. The eosinophile cell. Of these 2 and 3 are phagocytic, while 1 and 4 are not. The division of these cells into lymphocytes and myelocytes must be given up. The cells of the first group are found in various other organs than the lymphatic glands. It is the eosinophile cells which are specially formed in the bone marrow. The neutrophile cells develop in the blood itself at the expense of the small cells which have been formed in various organs. Leucocytes are found also in the lowest fishes which have neither lymphatic glands, bone-marrow, nor spleen, and are derived from the mesodermic cells of the embryo, and perhaps also from the endothelium of the blood-vessels. Leucocytes multiply by division in the blood—the large mononuclear variety chiefly by indirect, the polynuclear variety by direct division.

The phagocytic cells take up all manner of things into their interior. The most interest attaches to their absorption of bacteria. That these are taken up alive is shown by their movements in the interior of the cell, and also by the power of development retained by the englobed microbes. Every cell will not englobe every bacterium. Thus the leucocytes of mice and guinea-pigs will not devour the bacilli of anthrax, and many other examples are given where in cases in which the animal is peculiarly susceptible to a certain kind of bacterium, this is avoided by the leucocytes. Again, one kind of leucocyte will absorb one bacterium, a different kind, another. Thus in man the mononuclear leucocytes will not take up the streptococci of erysipelas or the gonococci, while these microbes are taken up by the polynuclear cells. The latter, on the other hand, will not take up the leprosy bacilli, which are readily devoured by the mononuclear cells. These observations show that the bacilli are not inactive bodies, otherwise they would be taken up indifferently like dead matter.

That chemiotaxis plays a great part in this process is now evident, and has been proved by Lehr, Buchner, and many other observers. The absorbed bacteria are often destroyed by the ferments now known to exist in the leucocytes. In other cases they continue to live in the body of the cell, and may subsequently invade the entire organism. Sometimes, although not killed, their development is delayed by the phagocytes.

That leucocytes can develop into connective tissue cells, although generally doubted by pathologists, is strongly maintained by the author. In amphioxus he has observed the change of polynuclear leucocytes into mononuclear, and of these into connective tissue cells. In mammalia we have no proof that the polynuclear leucocytes can be converted into mononuclear cells, but these do certainly become converted into epithelioid and giant cells.

Next to the leucocytes the endothelial cells of the vessels play the most important part in inflammation. These are primarily formed from the mobile cells on the surface of the yolk sac. They retain mobility, being contractile and even amœboid. They are also phagocytic, as in cases where pigeons have been inoculated with swine septicæmia, the endothelial cells of the hepatic vessels are found crowded with the bacilli. The connective tissue cells take a comparatively insignificant part in inflammation.

That the leucocytes emigrate from the vessels by their own amœboid movements, and that they are not passively forced through the wall is generally admitted, and is proved by the fact that the process will take place after the heart has stopped. The force drawing them out is chemiotaxis, and the absence of emigration after application of quinine is not due to paralysis of the corpuscles, which are still able to move, but to a negative chemiotaxis exerted by this substance. The same is the cause of the absence of emigration in many of the most virulent bacterial diseases.

Numerous experiments show that the nervous system exerts an influence on inflammation. This, however, would appear only to accelerate or retard its course.

Tuberculosis is taken as the type of a chronic inflammation. The views of Baumgarten, that the cells are derived from the fixed tissue cells, is opposed, and it is attempted to show that the giant and epithelioid cells are really derived from the mononuclear leucocytes and the endothelial cells of the vessels. A most interesting account is given of the struggle between these cells and the parasite.

There are two classes of serous inflammations. In the first, although the cells of the vessels react as usual, and allow a serous transudation which often contains numerous bacteria, there is no emigration, in consequence of a negative chemiotactic influence on the leucocytes. Hence in these cases the body falls an easy prey to the bacteria, as occurs in many of the most virulent bacterial diseases.

In the second class of serous inflammations the exudation may occur at a distance from the deposit of microbes, and may contain no bacteria at all. An example of this is seen in the serous pleurisy which accompanies diphtheria in guinea-pigs. It is believed that this serous fluid is not a means for destroying the microbes, but that it possibly may serve to attenuate or modify the action of their products, either by containing antitoxins or by diluting the bacterial toxins and so rendering them less active.

A study of comparative pathology shows that serous inflammations are more recent in their evolution than those which are attended with a leucocytic reaction; they are also of less importance than the latter.

Finally, the current theories of inflammation are submitted to examination and shown to be insufficient, while the arguments which have been raised against the theory of the author are met and answered.

We have been able to touch only on a few of the most important details given in this most fascinating book. No other pathological work of recent years is so full of interesting and suggestive matter, and we cannot too highly recommend it to the attention of all our readers. The text is copiously illustrated with engravings, and there are three coloured plates appended.

The translators have left nothing to desire in the way they have done their work, and we owe them a debt of gratitude for making this truly remarkable work accessible to all English readers.

The Diseases of Childhood (Medical). By H. Bryan Donkin, M.D. (Oxon.), F.R.C.P.; Physician to the Westminster Hospital, and to the East London Hospital for Children at Shadwell; Joint Lecturer on Medicine and Clinical Medicine at Westminster Hospital Medical School. London: Charles Griffin & Co. 1893. Pp. 433.

This volume forms the latest addition to Griffin's most excellent series of Medical Text-books. It is printed and brought out in the same faultless style as the other productions of the same publisher.

Dr. Donkin's work is one of those which are always valuable as representing the personal and prolonged observations of a careful observer. It is based to a great extent, as he says in the preface, on the records and recollections of nearly twenty years' experience at the East London Hospital for Children and elsewhere. With a candour and modesty, which are as admirable as they are rare, he says, "Notices of variola and of some other maladies, of which my personal experience has been inconsiderable, have been omitted."

In arrangement, the book resembles most of the modern works on Diseases of Infancy and Childhood. The author, being limited as to space, has assumed the reader's general knowledge of the diseases discussed, and emphasised only the points pertaining to childhood; hence, though the work is not excessively large, space is left for the introduction of many illustrative cases which add to the interest and value of the book.

The first chapter—perhaps the most important in the book—on Infantile Wasting and the Feeding of Infants, is good and practical. We are glad to see that Dr. Donkin, in his remarks on feeding, relies far more on the results of experience and observation than on any theoretical considerations based on the comparative analyses of cow's and woman's milks:—"It is plain that here, as elsewhere, biologico-chemical averages, owing to the complexity of their data, are not of paramount value for practical application to individual cases." We regret, however, that the author's directions as to feeding children are not more full. Practically no directions are given as to the age at which the diet of infancy may be extended by the addition of bread, puddings, meat, &c. It appears to us that any work on Childhood and Infancy should devote a very large space, indeed, to the subject of Food in Health and Disease, and that the directions should be extremely full and definite. The average young doctor finds it far more easy to treat a case of scarlatina than to advise a mother as to exactly the best food to give her child. We think, too, there might have been a chapter on Baths and Clothing—subjects on which it is not easy to obtain information from books.

The descriptions of the various forms of disease, diagnosis, &c., are good. We regret, however, to say, we think the sections on treatment lack preciseness In a work on Children's Diseases the doses of each drug recommended in any disease should be indicated for various ages. In the book before us hints are given rather than directions. That is all very well if Dr. Donkin's readers had some of his experience, in order to enable them to translate his hints into practice, but we fear the junior practitioner may find a difficulty at first in doing so. As an example, we find in the chapter on Bronchitis: "Carbonate of ammonia I give in nearly all cases"—nothing being said as to how much or how often. We think Dr. Donkin's readers are just as much entitled to know how he employs a drug as what drug he recommends.

Perhaps we have laid too much weight on this want of preciseness, for in other respects we are greatly pleased with the work. It is written in a sensible and quiet spirit, and evidently comes from the pen of a man who has no love for the latest fads in medicine, whatever they may be. We believe that our readers will derive many valuable hints from its perusal.

Brown's "South Africa:" a Practical and Complete Guide for the Use of Tourists, Sportsmen, Invalids, and Settlers. London: Sampson Low, Marston & Company. 1893. 8vo. Pp. 233.

Mr. A. Samler Brown's "Guides" are now very widely and favourably known, and his "South Africa" will certainly enhance the popularity of the series. The object of the book, as stated in the preface, is to place in a condensed and easily intelligible form the mass of information necessary to tourists, sportsmen, invalids, and settlers—the four great classes of travellers in South Africa.

We, members of the medical profession, will naturally turn with greatest interest to those portions of the guide which describe South Africa as a health resort. Physicians and invalids alike are emphatically warned by the author, however, that this country is not adapted to those who cannot, to a certain extent, shift for themselves. "To send sick people in the last stages of consumption on a fatiguing journey which leads to places where the unfortunate patient cannot procure proper attention, is most certainly wrong." We heartily re-echo these words of Mr. Samler Brown, who further states that there is not a town or health resort in South Africa where he has not been requested to give the "uttermost prominence" to this fact.

"Although a young progressive country such as this," observes Mr. Brown, "cannot fail to keenly interest every visitor who will take the trouble to inform himself on the past history of its variously coloured races, on the enormous diversity and wealth of its indigenous flora and fauna, and on the magnificent geological problems which it spreads before even the most unobservant eye, those who pay it only a brief visit will naturally ask for a somewhat concise list of the most salient points which they ought not to miss."

These, the author thinks, might be briefly recapitulated as—Cape Town and its suburbs, Table Mountain, &c.; the Paarl, with excursions as far as Ceres and over Bain's Kloof; Worcester and the Hex River Pass; the Congo Caves at Oudtshoorn and the Zwartberg and Montagu Passes; the Knysna and other forests; Port Elizabeth, Grahamstown, Durban, Pieter Maritzburg, Howick, Kimberley and its diamond mines, Johannesburg and the gold mines, and so on. The visitor should on no account miss a "ride" in the train through some part of the Karroo or Veldt—that is, the dry highland districts and the plains respectively—nor should he omit to see as much as possible of the customs of the natives. The Eastern Provinces and Natal are the most attractive in this respect.

There is an immense fund of information in this book, and it is illustrated by a number of well-drawn coloured maps. We have sections on the game of South Africa, its history, meteorology, physical geography, productions, and mines. A number of routes through the South African Colonies from Cape Town as head-quarters are described, and this excellent "Guide" ends with a copious index of proper names and things. No visitor to South Africa should be without Mr. Brown's book, which is beautifully printed on a high-class paper and costs only half-a-crown.

Antiseptic Dry-air Treatment of Consumption: a Practical Treatise dealing with the Origin of Consumption: how it can be prevented and successfully treated by rational and safe means. By John J. Hartnell, M.D.; Fellow of the Obstetrical Society, &c. Second Edition. London: J. & A. Churchill. 1892. Pp. 104.

This is a very readable and original little book. It is, however, marred by a loose and somewhat exaggerated style of writing. It is mainly written to expound the system of treatment by medicated air advocated by the author.

His object is to make the patient continuously breathe air freed from excess of watery vapour, and "impregnated with volatile medicaments which impart to the atmosphere oxydising and antiseptic properties." This end he hopes to attain by the employment of an "antiseptic dry-air exhaler"—an instrument consisting of a fan worked by clockwork, which drives a current of air through frames covered with muslin or some kind of material wet with eucalyptus oil, guaiacol, sanitas oil, or some such body.

He also advocates an apparatus worked by the hand, whereby compressed air impregnated with these drugs can be inhaled. He gives notes of a number of cases treated by this method with wonderfully successful results.

There are, in addition, chapters on Food, Clothing, Health

Resorts, and Ocean Travels, which are characterised by common sense.

The book is short and easy to read, and we think most practitioners will benefit by its perusal.

The Stœchiological Cure of Consumption and Diseases of the Respiratory Organs. From "Letters to a Patient." By JOHN FRANCIS CHURCHILL, M.D. Third Edition. London: David Stott. 1893. Pp. 38.

WE shall not spoil Dr. Churchill's conundrum by explaining "that blessed word" *stœchiological.* It will be found in massive dictionaries. The author published in 1857 his discovery of the hypophosphites as an infallible cure for phthisis in its early stages. "They not only cure the disease when not advanced beyond a certain point; but, what is more important still, they are a sure preventive against it in the case of all who are predisposed to the complaint." He has now carried his mode of treatment to such perfection as "will hardly be surpassed until we have found the means of supplying new lungs." He has grown in the wisdom of the serpent since 1857. He has determined, "after mature reflection," to keep his knowledge to himself this time; and the profession will never know *certain* specifics for diphtheria, whooping-cough, gout, rheumatism, neuralgia, heart disease, gravel, Bright's disease, and for immunity from tropical fever; *probable* cures for typhoid fever, cholera, and diabetes, and "possibilities too numerous to mention."

Manual of Urine Testing, including the Physical Characters, Qualitative and Quantitative Examination of the Urine; together with the Clinical Information to be derived therefrom. By JOHN SCOTT, B.A., M.B., B.Ch., B.A.O. (R.U.I.); Scholar and Prizeman in Medicine, Midwifery, &c., Queen's College, Belfast; Gold Medallist in Midwifery, Diseases of Women and Children, Ulster Hospital, Belfast. Second Edition, enlarged. Dublin: Fannin & Co. 1893. Pp. 52.

THREE years ago (November, 1890) we noticed with approval the first edition of this little book, written by one who was then but an undergraduate in Medicine though a graduate in Arts of the Royal University of Ireland. The author has since graduated in Medicine, Surgery, and Midwifery, and his excellent Manual has appropriately grown to more than double its original size. This second edition runs to 52 closely printed pages, full of valuable information, compared with only 25 pages in the first edition.

We can heartily recommend Dr. Scott's book as a reliable guide in urine-testing. Students, especially, will find in its pages all that is necessary to enable them to test urine either qualitatively or quantitatively. This Manual does great credit to Dr. Scott's powers both of acquiring and of imparting knowledge.

RECENT WORKS ON ANATOMY.

1. *Manual of Practical Anatomy.* Vol. I.—Upper Limb, Lower Limb, and Abdomen. By D. J. Cunningham, M.D., F.R.S. Edinburgh and London: Young J. Pentland.
2. *Dissections Illustrated. A Graphic Handbook for Students of Human Anatomy.* By C. Gordon Brodie, F.R.C.S. With Plates by Percy Highley. Part II.—The Lower Limb. London and New York: Whittaker & Co.
3. *The Rotatory Movements of the Human Vertebral Column, and the so-called Musculi Rotatores.* By Alfred W. Hughes, M.B., F.R.C.S., &c. Edinburgh: E. & S. Livingstone.
4. *Anatomy: Descriptive and Surgical.* By Henry Gray, F.R.S. Thirteenth Edition, by T. Pickering Pick. London: Longmans, Green & Co.

1. We know no one who writes simpler, clearer, or more readable anatomy than Professor Cunningham, and the present issue of his Practical Anatomy is no exception in this regard. Previous to this, his Practical Anatomy appeared in three volumes—one devoted to the upper and lower limbs and the thorax, a second to the abdomen, and the third to the head and neck minus the brain and organs of special sense, which latter were not included in any part of the work. The objection to this form was, that there were too many volumes, the price of the work was correspondingly high, and the absence of descriptions of the brain cord and sense organs made it incomplete. To the present edition these objections cannot be urged. The volumes are to be two, and the brain and sense organs are to be included. We think that it would be better if there were but one volume. Still there are advantages in the way of portability and handiness which weigh strongly in favour of the division into two.

The volume before us is in every way an excellent piece of work. It is not merely a new edition of the old manuals, on the contrary, it has been entirely re-written and re-arranged. In general it runs on nearly the same lines as its predecessors, but there are many changes in the details—much unnecessary matter has been left out, and greater brevity has been aimed at, and reached, without in any way injuring or crippling the descriptions. Several excellent illustrations and some good diagrams have been added. Very many of the illustrations are taken from frozen sections; on the other hand, the ordinary pictures of dissections are comparatively few. We would rather see them more numerous; it is a great aid to dissection to have before the student a good picture of a careful dissection of the part at which he is working. The diagrams are very good, but some of them require further explanation. For instance, it would be well to tell the student how the section is supposed to be made in that on page 252; the references are not correct in page 439. It is better to let the descriptions of illustrations err on the side of profuseness rather than in the opposite direction; frequently the student who consults them knows absolutely nothing about the region. The upper and lower limbs are treated in a most intelligible and judicious manner, sufficient directions are always given to guide the beginner in his course, and the points of practical surgical or medical importance are described with the greatest care, so that the advanced student will find much to engage his attention.

The latter half of the book is devoted to the abdomen, which is described in a most perfect and thorough-going manner. In this division of the work particularly, everything of practical importance is most fully treated. These remarks apply specially to the anatomy of hernia, and of the pelvic viscera in the female. Two very ingenious double-page plates illustrate the reflections of the peritoneum from the front and back walls of the abdomen respectively. One is by a Russian anatomist, the other by the author. Several of the illustrations of this region come from the old friend of all medical students, Gray's Anatomy.

In mapping out the regions of the abdominal cavity the author follows the plan which he proposed to the Anatomical Society of Great Britain and Ireland last winter, without reference to any other methods at present in use. It might have been well, though perhaps confusing, to briefly describe the plan adopted by many other anatomists.

From what we have said it will be seen that we are thoroughly pleased with Professor Cunningham's Manual. We think it an excellent work, clear, simple, correct, useful alike to the beginner and the advanced student, a thorough guide in the dissecting-room, and a handy and reliable book for home study.

2 This is the second of the four parts promised. The first part illustrating the anatomy of the upper limb, we have already reviewed in these pages, and upon that occasion we were able to give a very favourable opinion of the pictures included in that part. We also expressed an opinion that such illustrations accurately drawn from careful dissections may be most valuable aids in dissecting-room work, when used by the student as types of the dissections which he should produce, and as a means of identifying the various structures which he comes across. On the other hand, we believe that there can be nothing more detrimental to a practical knowledge of anatomy than substituting the study of atlases for practical dissection, which is the only true road to useful anatomy.

The illustrations are almost all two-thirds life size. The different structures are coloured in the conventional manner—veins blue, arteries bright red, nerves white and muscles dull red. The resulting pictures are very effective, all the structures come out in a very striking way, and can be readily recognised even in the darkest parts. Indeed we must say that the pictures are really pretty, at least to an anatomical eye, although perhaps here and there they do not quite satisfy the anatomical feelings as regards correctness. We think all such drawings should be made by the dissector himself, if perfect accuracy is to be obtained. No one without a thorough knowledge of anatomy can catch the thousand and one little points to be brought out in a picture of a dissection. What appears a trifling difference to the artistic eye, is possibly a grave mistake to the anatomist. On looking through the plates we noted the following points, which do not seem quite satisfactory to us. In the first picture (Plate XVIII.), the saphenous opening is almost two inches in length. This, in a drawing two-thirds life size, means an opening two inches and a half in the subject. In the next, the vastus internus seems to distinctly overlap the rectus in the middle of the thigh; and in the same plate the tyro might think that the vastus internus was the continuation of the adductor longus beneath the sartorius. In Plate XX., the twig of the obturator going to the obturator plexus, *seems* to become superficial by passing forwards in a wrong position; by looking higher up, this impression is perhaps corrected. Then follow good pictures of the inner side of the knee and front of the leg. The dorsum of the foot is not so pleasing, no internal saphenous nerve is indicated. Two fine pictures of the gluteal region are followed by a third in which some points are very indistinct, particularly the reflected obturator internus and gemelli, which suggest forcibly a misplaced anus. These are succeeded by a good gluteal region with sacral plexus dissected from behind, two good pictures of the back of the thigh, in the latter of which the superior articular arteries appear to slope upwards to an unusual degree. The popliteal space and the back of the leg are well done; but in Plate XXXIII. (small picture) there is an unusual condition of the popliteal artery shown, which is decidedly confusing and misleading to the beginner. Then the series is completed by four plates devoted to the sole of the foot. The first one is not quite satisfactory in its posterior part—the muscles are continued back too far, and there is too little of the os calcis seen.

The letterpress, so far as it is confined to indicating the structures numbered in the plates, is very good, but the additional remarks and descriptions thrown in are not always to the point or improving. In one place we are told that the crural canal is bounded *above* by Poupart's ligament. Hilton's law, that the nerve which supplies a muscle supplies the skin over the area of its muscular action, is suggested as possibly explaining the extensive skin supply of the long saphenous on the inner side of the leg, into the fascia of which a strong band of the tendon of the sartorius is continued, and can be traced as far almost as the ankle. When the same reasoning is applied to the distribution of the musculo-cutaneous on the outer side of the forearm, and the reader is reminded that the biceps sends a strong tendinous slip down to the fascia of the forearm, the subject becomes slightly strained, particularly as the slip from the biceps is continued down on the inner, the nerve on the outer side of the forearm. All this, as well as the remarks on the morphology of the deep flexors of the calf and the muscles of the sole, might well have been omitted.

Notwithstanding these minor drawbacks, we must give the work before us a warm word of praise. Taken all round, the pictures are decidedly good and useful. They are pleasing to the eye, the details are clear and striking, and we can recommend the atlas as one of the best we know of its kind.

3. This is a small monograph of some thirty-two pages, with five pages of illustrations, the scope of which is sufficiently indicated by the title. It is the record of an investigation carried out in the Anatomical Institute of Leipzig under the superintendence of the late Professor Braune.

The author first refers to the various statements made by different authorities, anatomists and physiologists, on the amount of rotation round a longitudinal axis allowed in the vertebral column, and the regions of the column in which this rotation takes place. With the object of clearing up certain discrepancies in these statements the investigation was undertaken. The method adopted was as follows :—The ribs were sawn off at the angles, the spinal muscles removed while the ligaments were left untouched. The pelvis was fixed securely to a vertical board, and a firmly fixed iron rod, round which the vertebræ could rotate freely, was introduced for some distance into the cervical spinal canal. A strong iron skewer was fixed to the occipital bone; this was used as a lever for rotating the column; and to each vertebra a light wooden skewer was attached, which showed the movement of each segment of the column; to each of these wooden skewers was fastened a small piece of cardboard, on which played a small plumb-line, this indicated on the cardboard the movement of the vertebra. By a simple calculation the movement between any two vertebræ could be determined.

The author then gives a record of the amount of rotation permitted between each two vertebræ in three columns treated in the manner described. The following are briefly the results obtained :—The lumbar spine possesses only an extremely slight power of rotation, so slight that none can be reckoned on during life. Incidentally it is pointed out that the lower articular processes of a lumbar vertebra are embraced so tightly by the superior articular processes of the vertebra next below, that no lateral motion is possible, although the contrary is sometimes taught. The dorsal region is capable of considerable rotation, to at least 45°, and in some cases even up to a right angle—that is, half a right angle on each side of the normal position. The movement is greater in the upper than in the lower dorsal region. The cervical vertebræ are specially distinguished by their great capability of rotation.

They possess a far greater amount of rotatory mobility than the dorsal vertebræ. The following would be about the average of Dr. Hughes' measurements; in every case the angle of rotation is calculated from the extreme position of rotation on one side to the extreme position on the other:—Lumbar region, about 12°; dorsal region, about 90°; cervical region, minus atlo-axoid joint, about 135°. In only one case is the alto-axoid rotation recorded—it was 105·7°.

Rotation of the whole vertebral column, including axis, about 342°, an amount of rotation which we think hardly takes place in the vertebral column of the living body.

Dr. Hughes says he undertook his research in order to settle certain discrepancies in the accounts of other writers; we think he ought to state more definitely how far he considers he has succeeded. There seems to be some want of uniformity in his statements—for instance, after previously showing us that the rotation permitted in the *whole* cervical region is about 240°, he states in his last paragraph that the neck rotation with that of the atlo-axoid joint added amounts to nearly a right angle.

As regards the musculi rotatores, he points out the extreme discrepancies in the accounts of these muscles in the best known English, German, and French work. As a rule, they are described as existing only in the dorsal region, &c. The author finds that they are present everywhere from the upper sacral region to the axis. There are two sets—the short bundles passing from vertebra to vertebra, arising from the arches of the vertebræ or bases of transverse processes, they are inserted into the arches at the sides of the spines; the long bundles which pass over one vertebra arise from the mammillary processes in the lumbar region, from the back of transverse processes in the dorsal, and from articular processes in the cervical region; they are inserted into the bases of the spines. It is pointed out that these muscles have very little effect indeed on the rotation of the spine, and it is suggested that instead of being called rotatores, that they should get an indifferent name, "Submultifidus," suggested by Professor Braune, is proposed by the author as the most suitable.

The little monograph is very interesting—the research has evidently been carried out with great care, the illustrations are very good, but we think that the conclusions of the author ought to be bolder and more definite.

4. GRAY has become a household word with every student of medicine, and even, we would say, with every member of the family, of every student of medicine in these countries, and no wonder, seeing that he has already reached his thirteenth edition. There must be something good in a work which appeals so strongly to the popular judgment. The anatomy is not of the high scientific kind, it is rather the anatomy of the surgeon; there are many things in it which we would wish to see different; the book is large, and, perhaps, a bit untidy; it labours under the disability of attempting to combine a dissecting guide and a systematic anatomy, nevertheless, new editions of it appear every other year. Students purchase it, wholesale we might say, and in many places it is the recognised text-book. It seems but the other day that we reviewed the last edition in these pages, and now comes another hot haste on its heels—another edition in every sense of the word—improved and revised. There is no radical change in the plan of the work, it runs still on the same old lines, but its descriptions are brought more up to date than in former issues. Occasionally one part of an article is quite up to the times, while another part, retained from the older editions, is entirely out of harmony with the later teaching. There are still to be found in several places faulty nomenclature or inaccurate description. For example, that ramus of the os pubis which is nearest to the vertical—the ascending or superior ramus of most anatomists—is still called the horizontal ramus, a most unfortunate and most misleading misnomer, which is possibly accountable for the fact that nearly all students who depend on Gray for their osteology have no idea of the natural position of the os innominatum. Still, the depression corresponding to the tympanum on the upper surface of the petrous portion of the temporal bone is outside the eminence of the superior semicircular canal. As in the past, all the muscles that can possibly by any strain of description be brought to a thin border or oblique line or tubercle are still brought and heaped on the border line or tubercle, to the extreme confusion of the poor student. For example, see the attachments to the oblique line of the radius, the borders of the scapula, or the tubercle of the femur. Still the pectineus is supplied chiefly by the obturator nerve with "additional branches from the anterior crural or accessory obturator"—the two inner lumbricals of the foot are supplied by the internal plantar. The lower edge of the gluteus maximus is marked by a line from the side of the coccyx to the lower part of the great trochanter.

The lateral sinus runs horizontally outwards from the occipital protuberance, and so on in other parts.

On the other hand, there are added in this edition many things that please us, particularly in the way of illustrations. Most of them are drawn from the beautiful preparations in the museum of the Royal College of Surgeons of England, but we think the method in which these drawings have been reproduced is not generally very satisfactory; in this regard the old pictures in Gray, which we have been looking at for years, are much superior. In the old illustrations everything stands out quite distinctly, every structure is clear and definite, and the anatomy of the part catches the eye at once. In many of the new ones, on the other hand, clearness of detail is not a strong character; there is a great want of contrast, and as a result the main lines of the picture do not strike one so decidedly. A notable exception to these remarks is the new picture of the lumbar sympathetic, taken from Henle, which is excellent. There are also many other useful new pictures of the heart, of the organs of generation—a decided advance on the old ones—of the abdominal viscera, although good pictures of the spleen, pancreas, and suprarenals are still wanting. Several diagrams of the cranial nerves after Flowers have been added, which we fear the student will not find very useful.

On the whole, the book is very considerably improved in the present edition; possibly the advance might be more uniform. Some regions seem to have been looked after more carefully than others; but taking the whole result, it is decidedly satisfactory.

Gray's Anatomy can truthfully be said to be a good, useful work, which tells its tale clearly and simply. It embraces the whole of human anatomy, and it particularly dwells on the practical, or applied, aspect of the subject, so that it forms a most useful, intelligible, and practical treatise for the student and general practitioner.

TYPHUS IN NEW YORK.

From January 1st to April 1st, 1893, there were 328 cases of typhus fever in New York city. Of the victims 316 were men and only 12 women. One hundred and eighty-one were between the ages of twenty-five and forty-five. One hundred and nineteen died.—*Medical Record.*

PART III.

MEDICAL MISCELLANY.

Reports, Transactions, and Scientific Intelligence.

ROYAL ACADEMY OF MEDICINE IN IRELAND.

President—George H. Kidd, M.D., F.R.C.S.I.
General Secretary—W. Thomson, F.R.C.S.I.

SECTION OF PATHOLOGY.

President—Prof. J. Alfred Scott.

Sectional Secretary—J. B. Story, F.R.C.S.I.

Friday, November 3, 1893.

The President in the Chair.

The President (Prof. J. Alfred Scott) delivered his opening Address on the Micro-chemistry of Cells in relation to the Theory of Immunity.

Favus: Spina Bifida Occulta.

Dr. J. O'Carroll next exhibited a patient suffering from favus. He said that she was admitted originally to the Children's Hospital, Temple-street, suffering from cough. She has now a fairly typical favus eruption on the head, which was more evident that night because the head was poulticed for twenty-four hours so as to get rid of the crusts due to a concurrent eczema and pediculi. She had also a large tuft of hair on the sacral or lumbar region, and a peculiar deformity about the left scapula at its superior angle, looking like an exostosis. He was no authority on spina bifida, but he thought there was a deficiency in the lumbar region. It was interesting, however, to know that a little sister of hers had a large meningocele in that region. He thought that the one he exhibited would come under the name of spina bifida occulta. He could not tell whether the affection of the scapula was of the nature of a torticollis or not.

Large Coagulum Adherent to the Mitral Valve in a Case of Acute Rheumatism Fatal through Hyperpyrexia.

Dr. J. W. Moore read a paper on this subject. It will be found at page 507.

Dr. Frazer inquired if there was any possible history of gonorrhœa in the case.

Dr. Moore informed him that no such history was forthcoming.

Mitral Narrowing.

Dr. James Little next exhibited a specimen of mitral narrowing. He said that probably this heart would be of much interest to those who were engaged in the daily practice of their profession. It was a rather highly marked example of narrowing of the mitral orifice due to atheromatous change. It was taken from a man of sixty years of age, who had swelled feet, short breathing, and the various signs of mechanical congestion of the venous system. He was unable to time the murmur which he heard at the apex, but it was, he thought, occasionally systolic and occasionally pre-systolic. After death they found a very narrow mitral orifice with atheromatous changes in the cusps of the mitral valve.

The specimen was of interest to those who have to do with clinical medicine, because it helps them to explain causes.

The President said the specimen was one well worthy the attention of the members. It was an exceedingly rigid one, and exhibited great narrowing.

Round-cell Sarcoma.

Dr. M'Weeney showed a round-cell sarcoma which had been removed on the 10th October by Mr. Chance at the Mater Misericordiæ Hospital. The patient was a woman aged about fifty. Six years previously a tumour about the size of a duck's egg had been removed from the front of the tibia, also by Mr. Chance. That growth had been in existence for four years, and the patient described it as brown. No record of its microscopic structure exists. The present tumour was first noticed eleven months ago. It was situated on the inner side of the thigh, a little below the knee, embedded in the subcutaneous fat, and at the time of removal had attained the size of a large orange. The skin over it was thinned and stretched, but not infiltrated. To the naked eye the tumour presented a fleshy lobulated appearance. A nodule about the size of a walnut was removed at the same time from a point a few inches below the large tumour, with which its structure was identical. The microscopic examination showed that both growths were round-cell sarcomata with distinctly alveolar arrangement. The cells were large, with vesicular nuclei and an abundance of protoplasm, so that they bore a close resemblance to epithelial cells, and the resemblance was increased by their arrangements in lengthily oval alveoli, whilst the stroma could hardly be traced between the individual cells. The nuclei contained granules which exhibited strong affinity for acid aniline stains, and bodies closely resembling the so-called cancer parasites could be seen. Numerous mitoses were visible, many of them being asymmetrical, and hyperchromatosis was of frequent occurrence.

The President said that these points were at present much debated by the Pathological Society of London. The great point in Ruffer's body was that it was an acid staining nucleus; but to his mind Dr. M'Weeney's specimens seemed larger than the ordinary coccidia.

Secondary Glaucoma.

Mr. Story exhibited sections of an eye removed from a healthy young man, who had subsequently lost the sight of his second eye from a similar affection. The globe was removed on account of secondary glaucoma (which had not as yet shown itself in the second eye). The angle of the anterior chamber was occluded, the pupil dilated, and some pigment adherent to the lens capsule. Thin, dark-coloured blood lay between retina and chorioid, and also in the vitreous cavity. The sections showed blood-clots partly organised on both sides of the retina, and at one place the retinal tissue merged directly into the organised clot.

The President said the attachment of the iris to the cornea would lead to blocking of the lymph channels, which was what Priestley Smith described as causing glaucoma.

Cystitis with Surgical Kidneys.

Dr. E. J. M'Weeney exhibited urinary organs from a case of cystitis with surgical kidneys. He said they were taken from a man who had gonorrhœa some twenty years before, and who suffered from stricture on and off. He came into the Mater one week ago with high fever, and was quite incapable of passing water. His bladder was aspirated twice over the pubes, and ultimately a catheter was passed, but in a few hours after he fell into a collapsed state, and before the end of two days was dead. On making a *post-mortem* examination, the prostate was found to contain a number of abscess cavities, from which pus came forth. There were numerous small prostatic calculi also. He endeavoured to make a chemical analysis of them, but the strong mineral acids had no effect on them. The bladder was greatly sacculated, so as to look like the interior of the left ventricle. The submucous tissue was converted into abscess cavities, from which pus welled forth. The kidneys also presented numerous spots of necroses, both in the cortex and running parallel with the course of the urinary tubules. He expected to find numerous micrococci, but on staining he could not find a single one. It seemed to be a case of chronic uræmia in which sudden symptoms developed.

The Section adjourned.

SANITARY AND METEOROLOGICAL NOTES.

Compiled by J. W. Moore, B.A., M.D., Univ. Dubl.; F.R.C.P.I.; F. R. Met. Soc.; Diplomate in State Medicine and ex-Sch. Trin. Coll. Dubl.

Vital Statistics

For four Weeks ending Saturday, November 4, 1893.

The deaths registered in each of the four weeks in the sixteen principal Town Districts of Ireland, alphabetically arranged, corresponded to the following annual rates per 1,000 :—

Towns	Weeks ending				Towns	Weeks ending			
	Oct. 14	Oct. 21	Oct. 28	Nov. 4		Oct. 14	Oct. 21	Oct. 28	Nov. 4
Armagh -	14·0	7·0	14·0	7·0	Limerick -	22·5	23·9	18·2	19·6
Belfast -	28·3	26·6	20·3	20·5	Lisburn -	17·0	12·8	29·8	12·8
Cork -	16·6	22·8	18·7	19·4	Londonderry	12·6	7·9	17·3	20·4
Drogheda	30·7	13·2	13·2	26·4	Lurgan -	13·7	27·4	13·7	22·8
Dublin -	23·6	23·4	20·1	26·1	Newry -	20·1	28·2	16·1	28·2
Dundalk -	20·9	8·4	33·5	12·6	Sligo -	15·2	5·1	10·2	20·3
Galway -	15·1	7·6	34·0	18·9	Waterford -	37·5	22·5	22·5	30·0
Kilkenny	28·3	18·9	33·0	42·5	Wexford -	4·5	36·1	36·1	27·1

In the week ending Saturday, October 14, 1893, the mortality in thirty-three large English towns, including London (in which the rate was 17·9), was equal to an average annual death-rate of 18·2 per 1,000 persons living. The average rate for eight principal towns of Scotland was 18·4 per 1,000. In Glasgow the rate was 19·3, and in Edinburgh it was 18·5.

The average annual death-rate represented by the deaths registered during the week in the sixteen principal town districts of Ireland was 23·6 per 1,000 of the population, according to the Census of 1891.

The deaths from the principal zymotic diseases in the sixteen districts were equal to an annual rate of 3·7 per 1,000, the rates varying from 0·0 in six of the districts to 11·2 in Limerick—the 16 deaths from all causes registered in that district comprising 6 from measles and 2 from diarrhœa. Among the 144 deaths from all causes registered in Belfast are 2 from measles, 1 from scarlatina, 10 from whooping-cough, 2 from diphtheria, 7 from enteric fever, and 3 from diarrhœa. Of the 5 deaths in

Newry 1 was from measles and 1 from diarrhœa. Among the 5 deaths in Dundalk were 1 from diphtheria and 1 from enteric fever. The 6 deaths in Kilkenny comprise 1 from scarlatina and 1 from simple-continued fever.

In the Dublin Registration District the registered births amounted to 202—116 boys and 86 girls; and the registered deaths to 164—78 males and 86 females.

The deaths, which are 4 over the average number for the corresponding week of the last ten years, represent an annual rate of mortality of 24·5 in every 1,000 of the population. Omitting the deaths (numbering 6) of persons admitted into public institutions from localities outside the district, the rate was 23·6 per 1,000. During the first forty-one weeks of the current year the death-rate averaged 26·7, and was 0·9 under the mean rate in the corresponding period of the ten years 1883–1892.

The number of deaths from zymotic diseases registered was 26, being 1 above the average for the corresponding week of the last ten years, but 10 under the number for the week ended October 7. The 26 deaths comprise 1 from measles, 1 from typhus, 1 from influenza, 3 from whooping-cough, 9 from enteric fever, 7 from diarrhœa, and 1 from erysipelas.

Thirty-one cases of enteric fever were admitted to hospital, being 4 over the admissions for the preceding week, but 7 under the number for the week ended September 30. Forty-two enteric fever patients were discharged, 4 died, and 195 remained under treatment on Saturday, being 15 under the number in hospital at the close of the preceding week.

Seven cases of scarlatina were admitted to hospital against 4 admissions in the preceding week: 9 patients were discharged, and 47 remained under treatment on Saturday, being 2 below the number in hospital at the close of the preceding week.

The hospital admissions for the week included, also, 14 cases of measles (being an increase of 4 as compared with the number for the preceding week): 33 cases of this disease remained under treatment in hospital on Saturday.

Deaths from diseases of the respiratory system, which had fallen from 18 for the week ended September 30 to 16 for the following week, further declined to 14—or 11 below the average for the corresponding week of the last ten years. The 14 deaths consist of 9 from bronchitis and 5 from pneumonia or inflammation of the lungs.

In the week ending Saturday, October 21, the mortality in thirty-three large English towns, including London (in which the rate was 18·8), was equal to an average annual death-rate of 18·4 per 1,000 persons living. The average rate for eight principal towns of Scotland was 18·6 per 1,000. In Glasgow the rate was 18·3, and in Edinburgh it was 19·4.

The average annual death-rate in the sixteen principal town districts of Ireland was 22·9 per 1,000 of the population, according to the Census of 1891.

The deaths from the principal zymotic diseases in the sixteen districts were equal to an annual rate of 3·1 per 1,000, the rates varying from 0·0 in nine of the districts to 5·6 in Limerick—the 17 deaths from all causes registered in that district comprising 3 from measles and 1 from diarrhœa. Among the 135 deaths from all causes registered in Belfast are 5 from measles, 1 from scarlatina, 1 from typhus, 7 from whooping-cough, 1 from diphtheria, 4 from enteric fever, and 7 from diarrhœa. The Registrar of Wexford District observes: "Scarlatina is prevalent."

In the Dublin Registration District the registered births amounted to 185—88 boys and 97 girls; and the registered deaths to 164—78 males and 86 females.

The deaths, which are 5 over the average number for the corresponding week of the last ten years, represent an annual rate of mortality of 24·5 in every 1,000 of the population. Omitting the deaths (numbering 7) of persons admitted into public institutions from localities outside the district, the rate was 23·4 per 1,000. During the first forty-two weeks of the current year the death-rate averaged 26·7, and was 0·8 under the mean rate in the corresponding period of the ten years 1883-1892.

Twenty-seven deaths from zymotic diseases were registered, being 1 over the number for the preceding week, and 3 above the average for the forty-second week of the last ten years. They comprise 2 from measles, 2 from influenza and its complications, 4 from whooping-cough, 9 from enteric fever,1 from choleraic diarrhœa, 6 from diarrhœa, and 1 from erysipelas.

Thirty-four cases of enteric fever were admitted to hospital, being 3 over the admissions for the preceding week: 22 convalescents from enteric fever were discharged, 7 died, and 200 remained under treatment on Saturday, being 5 over the number in hospital at the close of the preceding week.

Nineteen cases of scarlatina were admitted to hospital, against 7 admissions in the preceding week: 8 patients were discharged, and 58 remained under treatment on Saturday, being 11 over the number in hospital at the close of the preceding week.

The hospital admissions for the week included, also, 15 cases of measles (being 1 over the number for the preceding week): 37 cases of the disease remained under treatment in hospital on Saturday.

Deaths from diseases of the respiratory system, which had fallen from 16 for the week ended October 7 to 14 for the following week, rose to 30, or 4 above the average for the corresponding week of the last ten years. The 30 deaths comprise 20 from bronchitis and 4 from pneumonia or inflammation of the lungs.

In the week ending Saturday, October 28, the mortality in thirty-three large English towns, including London (in which the rate was 17·9), was equal to an average annual death-rate of 18·3 per 1,000 persons living. The average rate for eight principal towns of Scotland was 18·2 per 1,000. In Glasgow the rate was 19·9, and in Edinburgh it was 14·4.

The average annual death-rate represented by the deaths registered in the sixteen principal town districts of Ireland was 20·4 per 1,000 of the population, based on the Census of 1891.

The deaths from the principal zymotic diseases in the sixteen districts were equal to an annual rate of 2·4 per 1,000, the rates varying from 0·0 in ten of the districts to 8·5 in Lisburn—the 7 deaths from all causes registered in that district comprising 2 from diarrhœa. Among the 103 deaths from all causes registered in Belfast are 4 from measles, 3 from whooping-cough, 1 from diphtheria, 1 from enteric fever, and 7 from diarrhœa. The 13 deaths in Limerick comprise 1 from measles and 1 from diarrhœa, and the 11 deaths in Londonderry comprise 2 from diphtheria and 1 from enteric fever.

In the Dublin Registration District the registered births amounted to 153—78 boys and 75 girls; and the registered deaths to 138—73 males and 65 females.

The deaths, which are 29 under the average number for the corresponding week of the last ten years, represent an annual rate of mortality of 20·6 in every 1,000 of the population. Omitting the deaths (numbering 3) of persons admitted into public institutions from localities outside the district, the rate was 20·1 per 1,000. During the first forty-three weeks of the current year the death-rate averaged 26·5, and was 1·0 below the mean rate in the corresponding period of the ten years 1883–1892.

The number of deaths from zymotic diseases registered was 23, being 1 over the average for the corresponding week of the last ten years, but 4 under the number for the week ended October 21. The 23 deaths comprise 2 from measles, 3 from influenza and its complications, 2 from whooping-cough, 1 from diphtheria, 8 from enteric fever, 4 from diarrhœa, and 1 from erysipelas.

The number of cases of enteric fever admitted to hospital was 23, being 11 under the admissions for the preceding week: 30 enteric fever patients were discharged, 1 died, and 192 remained under treatment on Saturday, being 8 under the number in hospital at the close of the preceding week.

Sixteen cases of scarlatina were admitted to hospital. This number shows a decline of 3 as compared with the admissions in the preceding week: 8 patients were discharged, 1 died, and 65 remained under treatment on Saturday, being 7 over the number in hospital on Saturday, October 21.

The hospital admissions for the week included, also, 11 cases of measles (being a decrease of 4 as compared with the number of admissions for the preceding week): 42 cases of the disease remained under treatment in hospital on Saturday.

The number of deaths from diseases of the respiratory system registered was 21, being 9 under the number for the preceding week, and 10 below the average for the 43rd week of the last ten years. The 21 deaths comprise 9 from bronchitis and 11 from pneumonia or inflammation of the lungs.

In the week ending Saturday, November 4, the mortality in thirty-three large English towns, including London (in which the rate was 20·5), was equal to an average annual death-rate of 20·2 per 1,000 persons living. The average rate for eight principal towns of Scotland was 18·7 per 1,000. In Glasgow the rate was 18·4, and in Edinburgh it was 18·3.

The average annual death-rate in the sixteen principal town districts of Ireland was 23·0 per 1,000 of the population, according to the Census of 1891.

The deaths from the principal zymotic diseases registered in the sixteen districts were equal to an annual rate of 2·9 per 1,000, the rates varying from 0·0 in seven of the districts to 9·4 in Kilkenny—the 9 deaths from all causes registered in that district comprising 2 from scarlatina. Among the 104 deaths from all causes registered in Belfast are 2 from measles, 2 from whooping-cough, 1 from diphtheria, 1 from enteric fever, and 4 from diarrhœa. The 14 deaths in Limerick comprise 4 from measles and 1 from diarrhœa. The 12 deaths in Waterford comprise 1 from scarlatina, 1 from typhus, and 1 from enteric fever.

In the Dublin Registration District the registered births amounted to 168—84 boys and 84 girls; and the registered deaths to 180—95 males and 85 females.

The deaths, which are 2 under the average number for the corresponding week of the last ten years, represent an annual rate of mortality of 26·8 in every 1,000 of the population. Omitting the deaths (numbering 5) of persons admitted into public institutions from localities outside the district, the rate was 26·1 per 1,000. During the first forty-four weeks of the current year the death-rate averaged 26·5, and was 1·0 under the mean rate in the corresponding period of the ten years 1883–1892.

Thirty-five deaths from zymotic diseases were registered, being 8 in excess of the average for the corresponding week of the last ten years and 12 over the number for the week ended October 28. They comprise 4 from measles, 2 from scarlet fever (scarlatina), 2 from influenza and its complications, 2 from whooping-cough, 2 from diphtheria, 10 from enteric fever, 1 from choleraic diarrhœa, and 6 (all of children under 5 years of age) from diarrhœa.

The number of cases of enteric fever admitted to hospital was 23, being equal to the admissions for the preceding week, but 11 under the number for the week ended October 21. Thirty-seven enteric fever patients were discharged, 2 died, and 176 remained under treatment on Saturday, being 16 under the number in hospital at the close of the preceding week.

Only 12 cases of scarlatina were admitted to hospital against 16 admissions for the preceding week and 19 for the week ended October 21. Six patients were discharged, 2 died, and 69 remained under treatment on Saturday, being 4 over the number in hospital at the close of the preceding week.

There has also been a decline in the cases of measles treated in hospital, the admissions for the week being 6 only, against 11 for the preceding week and 15 for the week ended October 21, and the number under treatment at the close of the week having fallen from 42 on Saturday, October 28, to 26 on Saturday, November 4.

Thirty deaths from diseases of the respiratory system were registered, being 9 over the number for the preceding week, but 2 under the average for the 44th week of the last ten years. They comprise 22 from bronchitis and 4 from pneumonia or inflammation of the lungs.

Meteorology.

Abstract of Observations made in the City of Dublin, Lat. 53° 20′ *N., Long.* 6° 15′ *W., for the Month of October*, 1893.

Mean Height of Barometer, - - -	29·855 inches.
Maximal Height of Barometer (on 23rd, at 9 a.m.), -	30·507 ,,
Minimal Height of Barometer (on 4th, at 9 a.m.), -	29·061 ,,
Mean Dry-bulb Temperature, - - -	48·8°.
Mean Wet-bulb Temperature, - - -	46·5°.
Mean Dew-point Temperature, - - -	44·0°.
Mean Elastic Force (Tension) of Aqueous Vapour, -	·293 inch.
Mean Humidity, - - - - -	84·2 per cent.
Highest Temperature in Shade (on 21st), - -	67·7°.
Lowest Temperature in Shade (on 31st), - -	31·7°.
Lowest Temperature on Grass (Radiation) (on 31st)	24·9°.
Mean Amount of Cloud, - - - -	51·0 per cent.
Rainfall (on 16 days), - - - -	1·033 inch.
Greatest Daily Rainfall (on 14th), - - -	·322 inch.
General Directions of Wind - - -	W., S.W.

Remarks.

A favourable month, of average mean temperature and atmospheric ressure. There was an overwhelming prevalence of westerly and south-westerly winds, which kept the rainfall far below the average on the leeward side of the Dublin and Wicklow mountains—Thus, it was only 7·10 inch at both Greystones and Killiney; 1·033 inches in Dublin city; 1·140 inches at the Royal Botanic Gardens, Glasnevin; and 1·190 inches at the Ordnance Survey Office, Phœnix Park. Free of the mountains inland, the rainfall was much heavier. Even in London, not less than 3·900 inches of rain fell during the month. On the 20th and 21st there was a remarkable wave of heat. On the 30th and 31st the cold was equally decided.

In Dublin the arithmetical mean temperature (50·0°) was slightly above the average (49·7°); the mean dry bulb readings at 9 a.m. and 9 p.m. were 48·8°. In the twenty-eight years ending with 1892, October was coldest in 1892 (M. T. = 44·8°), in 1880 (M. T. = 45·4°), and in 1885 (M. T. = 45·5°), and warmest in 1876 (M. T. = 53·1°). In 1886, the M. T. was as high as 52·0°; in 1879 (the "cold year"), it was 49·7°; in 1887, it was as low as 47·3°; in 1888, it was 49·1°; in 1889, it was only 48·1°; in 1890, it was 51·7°, and in 1891, 49·5°. October, 1892, beat the record for coldness, but October, 1893, has proved of normal warmth.

The mean height of the barometer was 29·855 inches, or 0·015 inch above the corrected average value for October—namely, 29·840 inches. The mercury rose to 30·507 inches at 9 a.m. of the 23rd, and fell to 29·061 inches at 9 a.m. of the 4th. The observed range of atmospherical pressure was, therefore, as much as 1·446 inches—that is, a little less than an inch and a half.

The mean temperature deduced from daily readings of the dry bulb thermometer at 9 a.m. and 9 p.m. was 48·8°, or 6·0° below the value for September. The arithmetical mean of the maximal and minimal readings was 50·0°, compared with a twenty-five years' average of 49·7°. Using the formula, *Mean Temp.* = *Min.* + (*max.*—*min.* × ·485), the value was 49·8°, or 0·3° above the average mean temperature for October, calculated in the same way, in the twenty-five years, 1865–89, inclusive (49·5°). On the 21st, the thermometer in the screen rose to 67·7°—wind, S.W.; on the 31st the temperature fell to 31·7°—wind, N.W. The minimum on the grass was 24·9°, also on the 31st. On one night the thermometer sank below 32° in the screen, and on eight nights frost occurred on the grass. The corresponding figures in 1892 were 4 and 13 nights respectively.

The rainfall was only 1·033 inch, distributed over 16 days—the rainfall was considerably, while the rainy days were slightly, below the average. The average rainfall for October in the twenty-five years, 1865–89, inclusive, was 3·106 inches, and the average number of rainy days was 17·6. In 1880 the rainfall in October was very large—7·358 inches on 15 days. In 1875, also 7·049 inches fell on 26 days.

On the other hand, in 1890, only ·639 inch fell on but 11 days, in 1884 only ·834 inch on but 14 days; and in 1868 only ·856 inch on 15 days. In 1888, the rainfall was 1·227 inches on 16 days, and in 1889 no less than 4·853 inches fell on 22 days. In 1891, 3·590 inches fell on 13 days; and in 1892, 2·535 inches on 17 days. From these figures it will be seen that October, 1890, proved the driest on record for more than a quarter of a century at least, while the rainfall in October, 1893, was only *one-third* of the average.

A lunar corona was seen on the 24th. There was an aurora borealis on the evening of the 29th. High winds were noted on 10 days, and attained the force of a gale on two occasion—the 25th and 28th. The atmosphere was more or less foggy in Dublin on the 7th, 18th, and 20th. Lightning was seen on the evenings of the 3rd, 4th, 5th, and 30th. Hail fell on the 26th.

The week ended Saturday, the 7th, proved to be one of low atmospherical pressure, low temperature, and changeable showery weather, the showers being from time to time accompanied by thunder and lightning in many places. The most important reduction of pressure occurred on Tuesday and Wednesday—at 8 a.m. of the latter day the barometer was below 29 inches throughout a large triangular area covering two-thirds of Scotland, the north of England, and the north-eastern third of Ireland. Gradients were nowhere steep, and so the winds—although varying much in direction—were not strong except off the south of Ireland and in the English Channel. Connected with this large primary cyclonic system, were a number of shallow secondary depressions, which caused thunder and hail—as well as rain—showers as they passed across the country. Temperature was not so low in the S. and S.E. of England as in other parts of the kingdom, and on Sunday the thermometer rose to 67° at Loughborough and Cambridge, 66° in London and at Dungeness, and 65° at Hurst Castle. On the other hand, a minimum of 28° was registered at Nairn, in Scotland, on Wednesday morning. In Dublin the mean height of the barometer was 29·362 inches, pressure being observed to vary between 29·624 inches, at 9 p.m. of Sunday, (wind W.) and 29·061 inches, at 9 a.m. of Wednesday (wind also W.). The corrected mean temperature was 49·3°. The mean dry bulb temperature at 9 a.m. and 9 p.m. was 47·2°. On Sunday the thermometer rose to 59·2°, on Saturday it fell to 37·9° in the screen. The rainfall was ·168 inch on five days, ·051 inch being measured on Wednesday. Lightning was seen on the evenings of Tuesday, Wednesday and Thursday. The prevailing wind was westerly. The weather was much more broken in England than in Ireland during the week.

Atmospherical pressure was unsteady during the week ended Saturday, the 14th, and therefore the weather was unsettled and changeable. Until Friday, when a very warm, moist south-westerly, or equatorial current began to pass over Ireland, the air was cold and rather dry in this country. In England, on the contrary, heavy falls of rain took place, accompanied by thunder and lightning and at times by strong and squally S.W. winds. In London, from one inch to an inch and a quarter of rain fell on Monday night, and the total fall for the three days ending 8 a.m. of Thursday was no less than 1·84 inches. These heavy rains were due to the passage up the English Channel of two depressions in quick succession—one on Monday, the other on Wednesday. At this time, although the barometer was rather low, bright, sharp weather prevailed in Ireland, showers occurring at intervals. On Thursday an area of high pressure passed over this country. The weather turned colder and became fine and dry in England, while in Ireland a warm S.W. wind arrived on Friday, causing dull, rainy weather, and an increase of temperature amounting to from 20° to 25° Fahr. The result in Dublin was that on Saturday the interior of most houses became dripping wet, from the condensation as dew of the vapour of the warm air current upon the walls, ceilings, and floors, chilled by the previous cold weather and remaining below the point of saturation or the dew point. Rain fell heavily on Saturday afternoon. In Dublin the mean height of the barometer was 29·846 inches, pressure ranging between 29·683 inches at 9 a.m. of Sunday (wind W.), and 30·160 inches at 9 p.m. of Thursday (wind W.N.W.). The corrected mean temperature was 48·8°. The mean dry bulb temperature at 9 a.m. and 9 p.m. was also 48·8°. On Tuesday the thermometers in the screen fell to 37·1°, on Saturday they rose to 65·0°. The rainfall was ·431 inch on three days, ·322 inch being measured on Saturday. The prevalent winds were W. and S.W.

Taken as a whole, the weather of the week ended Saturday, the 21st, was distinctly favourable and of a mild type—indeed, both at the beginning and at the end temperature was much above normal, although the minima were low on Tuesday night in Scotland and parts of both England and Ireland, and on Wednesday and Thursday nights in central England. On the other hand, Friday night proved abnormally warm in many places, and in Dublin the thermometer actually rose to 67·7° (nearly 68°) in the screen. Comparatively little rain fell, except in the south of Ireland and over the south and east of England as well as in parts of the English Midlands on Tuesday, when a shallow depression travelled in a direction from W.N.W. to E.S.E. from the mouth of St. George's Channel across the S.W. of England to the N.E. of France. This rain-system caused falls of 1·25 inches at Roche's Point, 1·57 inches at Hurst Castle, where a storm of thunder and lightning occurred at 1 30 a.m. of Wednesday, and ·75 inch in London. The rainfall was ·67 inch at Parsonstown, but only ·07 inch in Dublin. As this disturbance passed off, an anticyclone formed in the S., and the barometer rose to 30·40 inches or slightly more on Friday morning over the S. of England, N. of

France, and centre of Germany. Along the north-western face of this anticyclone a very warm south-westerly current spread over Ireland on Friday, the temperature becoming singularly high at night. Saturday was first fine and warm, afterwards rainy and much cooler. In Dublin the mean height of the barometer was 30·099 inches, pressure ranging between a minimum of 29·762 inches at 9 p.m. of Sunday (wind W.S.W.) and 30·370 inches at 9 a.m. of Thursday (wind S.W.). The corrected mean temperature was 55·4°. The mean dry bulb reading at 9 a.m. and 9 p.m. was 54·5°. On Saturday the thermometers in the screen rose to 67·7°; on Wednesday they fell to 41·0°. The rainfall was ·238 inch on four days, ·098 inch being measured on Saturday. The prevailing winds were W. and S.W. A wet fog prevailed on Wednesday morning, and there was a smoke fog on Friday.

At first fine and dry, except in the S. and S.E. of England, where Sunday was dull and rainy, the weather afterwards became squally, showery, and generally changeable during the week ended Saturday the 28th. In the earlier period, an anticyclone lay over the S. of Ireland, the barometer rising on Monday morning to 30·55 inches at Valentia Island and Roche's Point, 30·52 inches at Parsonstown, and 30·51 inches in Dublin. This high pressure system soon moved away south-eastwards, and at the same time decreased in size. Simultaneously, a general reduction of atmospheric pressure took place in the N. and N.W., causing steeper gradients for westerly winds—that is, winds between S.W. and N.W., and showery, unsettled weather. On Tuesday and Wednesday rain fell heavily over the N. of Ireland and S. of Scotland, and in smaller quantities over the greater part of the kingdom. Hail fell in many places and lightning was seen at Belmullet on Wednesday night. On Thursday evening the moon shone with unusual lustre. A decided rise of temperature occurred on Friday, while Saturday was stormy with frequent showers, and, at times, rainbows. In Dublin the Mean height of the barometer was 30·038 inches, pressure rising to 30·507 inches at 9 a.m. of Monday (wind W.) and falling to 29·638 inches at 4 p.m. of Saturday (wind W.). The corrected mean temperature was 49·6°. The mean of the dry bulb readings at 9 a.m. and 9 p.m. was 49·2°. On Wednesday the thermometer rose to 59·8° in the screen; on Friday, it fell to 38·2°. The rainfall was ·184 inch on three days—·109 inch being registered on Wednesday and ·041 inch on Saturday. The prevailing wind was westerly.

The last three days were cool and fair in Ireland—an aurora borealis with carmine streamers was seen about 6 p.m. of Sunday, the 29th, and there was sheet lightning on the evening of the 30th. Sharp frost occurred on the 31st.

The rainfall in Dublin during the ten months ending October 31st amounted to 16·141 inches on 138 days, compared with 12·366 inches on

123 days during the same period in 1887, 19·219 inches on 147 days in 1888, 24·789 inches on 169 days in 1889, 21·494 inches on 162 days in 1890, 21·610 inches on 148 days in 1891, 22·445 inches on 167 days in 1892, and a twenty-five years' average of 22·840 inches on 160·4 days.

At Knockdolian, Greystones, Co. Wicklow, the rainfall in October amounted to only ·710 inch on 15 days. Of this quantity ·225 inch fell on the 17th. The rainfall at Greystones in October, 1889, was no less than 6·935 inches on 22 days, or more than 11 times as great as the fall in October, 1890, when only ·600 inch fell on 13 days. In 1891, 5·122 inches fell on 14 days, and in 1892, 3·340 inches on 15 days. From January 1st, 1893, up to October 31st, rain fell at Knockdolian on 133 days to the total amount of 17·801 inches. In 1892, the rainfall of the corresponding ten months was 27·223 inches on 140 days.

At Cloneevin, Killiney, Co. Dublin, the rainfall in October, was ·710 inches on 14 days, compared with 3·040 inches on 17 days in 1892, and an eight years' average of 3·201 inches on 16 days. Since January 1, 1893, 14·61 inches of rain have fallen at this station, compared with an average of 20·353 inches in the previous eight years.

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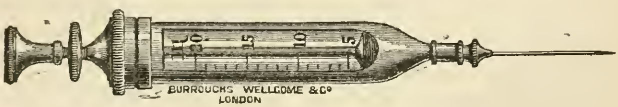

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THE REUBEN HARVEY MEMORIAL PRIZE.

We would draw attention to the announcement that the fourth award of this Triennial Prize will be made on July 1st, 1894. The competition for the prize is open to all Students of the various Schools of Medicine in Dublin which are recognised by the Medical Licensing Bodies in Ireland, and also to Graduates or Licentiates of these Bodies of not more than three years' standing at the time of the award. The Prize—£25 in value—will be awarded to the writer of the best essay, on a subject to be selected by the candidate, evidencing original research in Animal Physiology, or Pathology; the essay to be illustrated by Drawings or Preparations. The essays, bearing fictitious signatures, are to be lodged with the Registrar of the Royal College of Physicians of Ireland, Kildare-street, Dublin, on or before June 1st, 1894. We trust that there will be keen competition for this prize, which was founded to perpetuate the memory of one of the ablest of modern physiologists—Reuben Joshua Harvey, M.D., of the Carmichael College of Medicine, Dublin.

INDEX

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EDITED BY

JOHN WILLIAM MOORE, B.A., M.D., M.Ch., Univ. Dubl.;

FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS OF IRELAND;
PHYSICIAN TO THE MEATH HOSPITAL AND COUNTY DUBLIN INFIRMARY;
CONSULTING PHYSICIAN TO CORK-STREET FEVER HOSPITAL;
EX-SCHOLAR OF TRINITY COLLEGE, DUBLIN.

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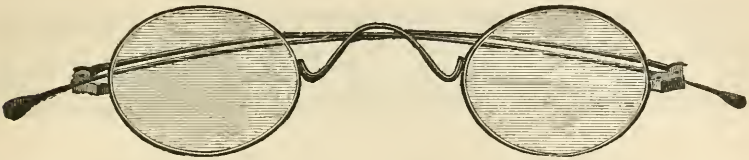

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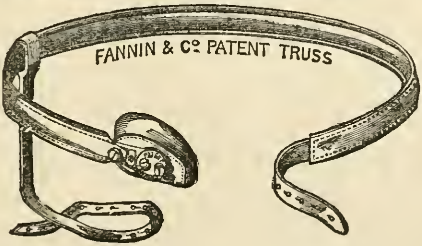

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